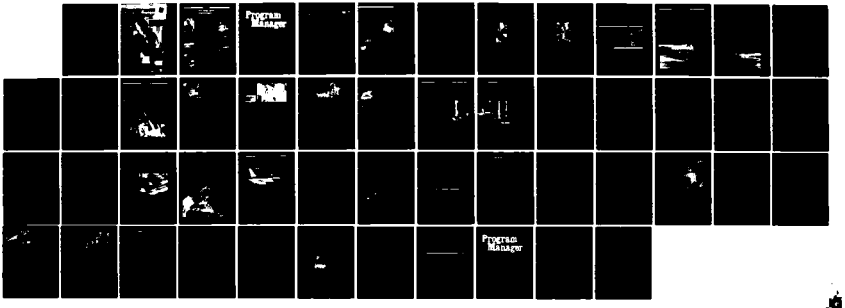
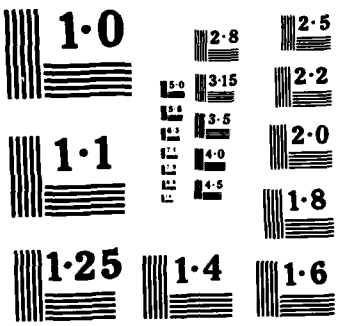
AD-A156 456 PROGRAM MANAGER: THE JOURNAL OF THE DEFENSE SYSTEMS MANAGEMENT COLLEGE VOLUME 14 NUMBER 3 MAY-JUNE 1985(U) DEFENSE SYSTEMS MANAGEMENT COLL FORT BELVOIR VA JUN 85 DSMC-65 F/G 5/1 1/1

UNCLASSIFIED NL





May-June 1985

Program Manager

...s Management Colleg...

...tary Logistics:
... Value for your
...ense Dollar

...grating facility
...uirements

... Scientific and
...hnical
...power Base

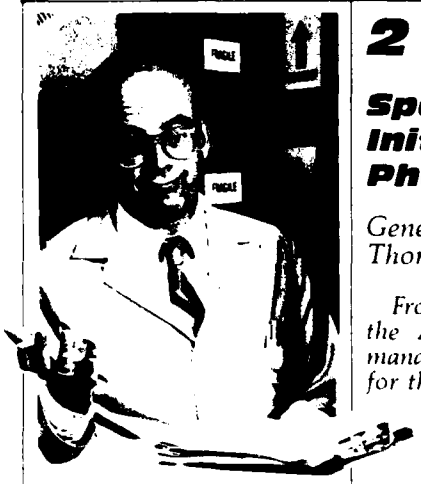
...cessful Manning
...ew Defense
...tems

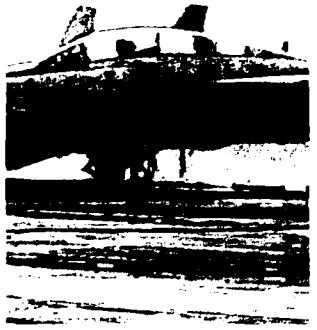
... Consistent Challenge:
...re Parts

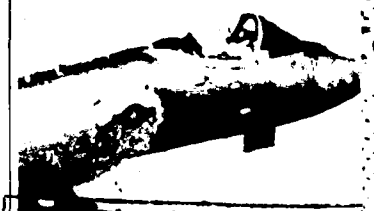
CONTENTS

Program Manager

Vol. XIV, No. 3 DSMC 65
May-June 1985







For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402

The Journal of the Defense Systems

Program Manager

Management College

Subscription rate is $17.00 per year for six issues. Single copy is $3.00. The foreign subscription price is $21.25. The foreign single issue price is $3.75. See subscription blanks for ordering instructions.

SUBSCRIPTION ORDER FORM
ENTER MY SUBSCRIPTION TO
ProgramManager (SIX ISSUES) (PM)

[ ] $17.00 U.S. and possessions
[ ] $21.25 foreign subscriptions

Credit Card Orders Only

Total charges $ Fill in boxes below

Credit Card No.

Expiration Date Month/Year

Send Subscription to:

Name-First, Last

Street Address

Company name or additional address line

City State ZIP Code

(or Country)

PLEASE PRINT OR TYPE

Enclosed is $_____ ☐ check ☐ money order, or charge to my Deposit Account No.

☐☐☐☐☐☐-☐

Order No._____

PAYABLE TO SUPT. OF DOCUMENTS

Mail to: **Superintendent of Documents**
U.S. Government Printing Office
Washington, D.C. 20402

DEFENSE SYSTEMS MANAGEMENT COLLEGE

Commandant
Rear Admiral Roger D. Johnson, USN

Deputy Commandant
Colonel Thomas V. Forburger, USA

Dean, Department of Research and Information
Captain Lucian C. Evans, USN

PROGRAM MANAGER

Editor-in-Chief
Robert W. Ball

Acting Managing Editor
Catherine M. Clark

Contributing Editor
David D. Acker

Editorial Assistants
Esther M. Farria
Dorothy L. Reago
Darlene W. Miller

Design Director
Greg Caruth

Illustrator
SSG Ron Valentine, USA

Photographer
PH3 John A. Chapman, USN

Printing Officer
MSgt Frank Scavotto, USAF

Program Manager (ISSN 0199-7114) is published bimonthly by the Defense Systems Management College, Fort Belvoir, VA 22060-5426, and is intended to be a vehicle for the transmission of information on policies, trends, events, and current thinking affecting program management and defense systems acquisition.

Statements of fact or opinion appearing in *Program Manager* are solely those of the authors and are not necessarily endorsed by the Department of Defense or the Defense Systems Management College. Unless copyrighted, articles may be reprinted. When reprinting, please credit the author and *Program Manager*, and forward two copies of the reprinted material to the Editor-in-Chief.

To subscribe, government personnel should submit written requests (using their business addresses) to the Editor-in-Chief. Non-government employees and organizations may subscribe at $17 annually through the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Manuscripts and other correspondence are welcome and should be addressed to the Editor-in-Chief. Inquiries concerning proposed articles may be made by phone at (703) 664-5082 -5974 or AUTOVON 354-5082 -5974. Second class rate entered at Fort Belvoir, VA.

POSTMASTER: Send address changes to Editor-in-Chief, *Program Manager*, Defense Systems Management College, Fort Belvoir, VA 22060-5426.

THE CHALLENGE

The reform of spare-parts acquisition received emphasis more than a year ago with the publication of the Secretary of Defense's 25 initiatives and 10-point plan. After applying thousands of hours of resources, the Army has made great progress in the challenge to ensure price reasonableness. But, more remains to be done.

After reviewing progress to date, I directed that the Army program of reform, "Spare Parts Review Initiatives" (SPRINT), be expanded. This would be an evolutionary program built on successes of SPRINT, phase one, and would have a prime objective to increase the Army's already favorable statistics on competition. Moreover, this program would help to ensure the institutionalization of Secretary of Defense initiatives.

The resulting development of these initiatives, encompassed in a phase two implementation plan published in March 1985, is because of a coordinated effort by the Army's seven major buying commands and U.S. Army Materiel Command (AMC) Headquarters staff elements. In this paper, I will review SPRINT accomplishments and relate them to our expanded spare-parts program.

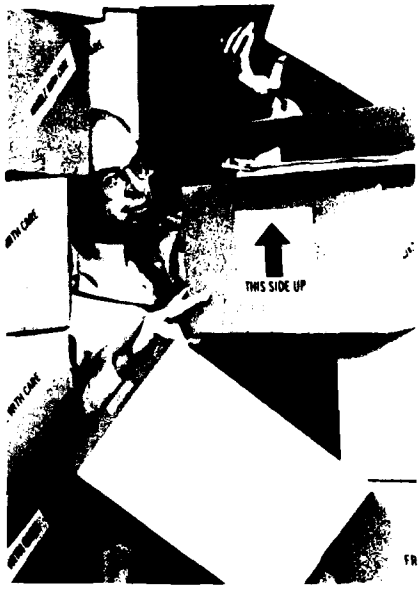
Discipline, People, Training and Common Sense

Phase two of the AMC program of spare-parts reform is based on a foundation of discipline, executed by well-trained people who apply common sense to managing the Army spare-parts mission. Main objectives of phase two are to ensure that prices the Army pays for spare parts meet basic tests of reasonableness, and that this attention depicts the AMC concern about prudent stewardship of vital resources entrusted to it.

The new program is "Total Re-evaluation under SPRINT Thrusts" (TRUST), which entails 10 prime initiatives containing expanded actions stemming directly from phase one; or from new actions developed to meet specific goals and objectives.

Resources

During SPRINT phase one, attention to effective spare-parts pricing was accentuated by a vigorous employee-awareness program involving all employees within AMC. This was not without its rewards; over 299 awards averaging $750 were given to people making tangible contributions to the overall improvement of spare-parts acquisition. One person at the Communications-Electronics Command, Captain George H. Wotton, received a cash award stemming from a suggestion and work on a test set for the QUICK FIX IV, an airborne direction finding and receiving jamming system. This suggestion, submitted under a SPRINT program called ESP (Emphasize Spare Parts), resulted in cost avoidance of more than $900,000.



CECOM is developing the "paperless office" to increase productivity.

During phase two, the awards program will continue. Besides continuing the cash awards, each quarter I will sponsor a special award for excellence to an employee from each AMC Major Subordinate Command (MSC) who has helped AMC meet its phase-two goals.

We are giving increased emphasis to tracking resources allocated to spare-parts reform and competition. Both the hiring of new personnel for spare-parts reform and an effort to "contract out" a portion of the screening and coding of items are being monitored, with special attention on cost effectiveness.

Management

Central to this initiative is an examination of basic management functions in the execution of the spare-parts initiatives. Even though providing spare parts to the most modern and well-equipped Army the world has ever known is a complex task, common sense is still a valuable commodity in making the system work. This approach extends throughout the rest of our phase-two reform initiatives.

Competition

The most cost-effective method to ensure price reasonableness is through using forces of the marketplace in full and open competition. The AMC record for competing spare parts is good, increasing from 47 percent to 51 percent during phase one. During the next phase, an aggressive goal of 55 percent should be achieved. Vehicles to reach this goal are two: continuation of the AMC "breakout" program, which identifies items to be purchased either in full and open competition or from the actual manufacturer; and the "competition advocacy program," which challenges all non-competitive acquisitions.

During fiscal year 1984, the Army realized $188 million in savings from increased competition and from purchases directly from the actual manufacturer. A further increase in the rate of competition on spare parts is expected to yield commensurate savings of taxpayers' dollars.

Spare-Parts Training

As I mentioned, phase two is to be effected through, and with, trained people. Phase one brought us an effective formal course on spare-parts management taught by the Army Logistics Management Center (ALMC), Fort Lee, Va., on site at the major buying commands. With over 800 graduates, this course is helping AMC increase the level of expertise in the workforce to control prices on spare parts. Also, 25,000 additional hours of local training in spare parts were given the past year.

These statistics show that a root cause of overpricing—lack of training—is being addressed. During the

next phase, our training efforts will be furthered by using advanced techniques like satellite video teleconferencing and computer-assisted training.

Increased Discipline in Pricing

Discipline, attention to detail, timeliness, and quality are paramount in establishing a reasonable price for the parts AMC buys. Perhaps the most evident manifestation of our efforts to increase discipline is represented in the control of unpriced contractual instruments. During the late 1970s and early 1980s, our buying activities increased the use of unpriced instruments, and the time to arrive at an agreed-upon price started to creep up. In December of 1983, the Army had a balance of 4,163 unpriced instruments on hand, of which 3,292 were more than 180 days old. Dramatic action to lessen the balance during FY 84 resulted in a 69 percent reduction to 1,284 instruments on hand December 31, 1984.

During the next phase, continued emphasis on discipline in pricing will be directed at use of unpriced instruments on an exception basis, with specified limits on total numbers to be issued in any one fiscal year.

Development of People Initiatives

The AMC is 122,471 people strong. Instilling a will to fight the war against overpriced spare parts is a challenging task for managers at all levels. No matter how big the challenge, solutions and ideas must be people-oriented. While other means, such as automation and state-of-the-art data storage and retrieval, may enhance the effectiveness of our workforce, thousands of people making many individual decisions each day keep spare parts moving to our soldiers in the field. Just as the combat leader instills the will to fight an aggressor, we design our people-initiatives to instill the will to ensure price reasonableness.

The tools for phase two are continued emphasis on employee awareness, expanded awards, and swift action to correct negligence. I am convinced that our civilian and military personnel are as competent as any in the private sector. Getting people involved in the price-reasonableness challenge is AMC's best bet for success during phase two.

Exploit Value Engineering

The key word of this initiative is value as it relates to the function of each spare part. When the price the Army pays for any part is out-of-line with the function it performs, value-engineering techniques can bring the discrepancy back into line. The AMC has maintained an effective value-engineering program, and building on these successes is paramount during phase two. Keeping in mind that this initiative is the second biggest "bill payer" for AMC, additional resources

Common sense is still a valuable commodity in making the system work.

have been directed to value engineering during FY 85, plus a program of goals and objectives. During FY 84, $20.1 million in savings were realized; for FY 85, the goal is $33 million. Our engineers have their work cut out for them.

■ *General Thompson is the commanding general of the U.S. Army Materiel Command.*

Automation

The 1980s have been called the decade of the computer. Advances in computer and automation technology have been staggering. What has been astonishing is that, contrary to trends in other industries, the cost of computing and automation has decreased dramatically. Where automation and computer-assist can result in tangible productivity gains, they should be explored. Phase two manages this technology through many initiatives designed to increase productivity. Electronic ordering, in which orders are sent via data lines rather than mail, increases responsiveness, reduces lead time for spare parts, and increases control over day-to-day handling of voluminous order data.

Another example of this trend is the Command Automated System for Procurement being developed by our Communications-Electronics Command (CECOM). This "paperless office" concept increases productivity by eliminating manual handling of documents.

A final example is the AMC Digital Storage and Retrieval Engineering Data System (DSREDS). The first DSREDS unit was contracted for in August of 1984; during phase two, the remaining units will be placed on order and installed at our buying commands. Accurate and complete reprocurement technical-data packages are necessary to complete items and this state-of-the-art system will replace outdated and obsolete equipment. Digital storage and retrieval of technical data will result in an overall improvement in the management of a very valuable resource for the Army.

Sustainment: Effective Requirements Determination and Execution

"How many, of what kind, and by when?" encompass the broad scope of requirements determination. Too often in the past, the execution of prudent requirements management resulted in less-than-efficient ordering practices. When parts are not ordered in the most effective manner, the result is usually a higher-than-necessary price. Since this initiative is inherently critical to effective spare-parts management, it is now a major focal point of phase two. There will be efforts to consolidate procurement work directives, to order

less frequently, and to determine the most economical order-quantity. Systematic solutions to pricing problems are most likely to be impacted through execution of this initiative.

Price Reasonableness

Price reasonableness is fundamental to the principles of all initiatives listed above. To ensure that prices paid are reasonable, we will give increased attention to sampling price-history files to identify discrepancies, and to continue pursuit of refunds from contractors where overpricing has occurred. More than $500 thousand have been received from contractors as a result of this program of voluntary refunds.

Our message to contractors is that AMC will not tolerate unreasonable prices on spare parts...

Our message to contractors is that AMC will not tolerate unreasonable prices on spare parts and will pursue refunds where overpricing is present.

If AMC were doing business in the private sector, it would rank as the eighth largest company in the United States. And, like the private sector, the challenges AMC faces in achieving its objectives require that a sound plan for the future be developed and that the plan be followed.

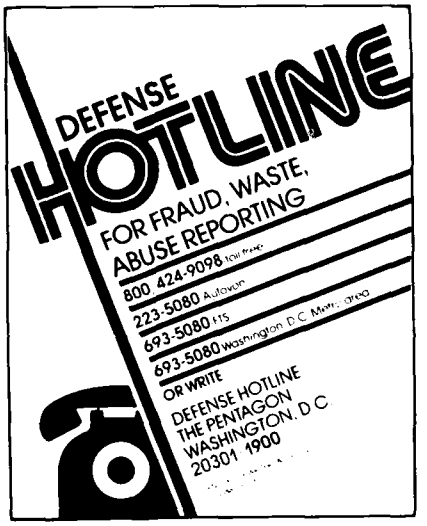
The AMC has that plan. Built on a base of success under SPRINT, I expect TRUST to be our sustaining force throughout the 1980s for spare-parts acquisition.■

New Design for Bridge Decks

Catherine Kominos, an engineer in the Engineer Support Laboratory, Troop Support Command, Belvoir R&D Center, has developed a new design for bridge decks that could reduce the weight of Army bridges by almost 20 percent. Ms. Kominos works in the Concepts and Composites branch of the Lab's Bridge Division and began work on the design as an in-house laboratory independent research (ILIR) project. Branch chief Richard W. Helmke suggested she experiment with a membrane and shell structure as a design for a bridge deck. Bridge mobility is directly related to the weight of bridge components with the heaviest part being the deck. Traditionally, military bridges were designed as deck-floor beam systems that carried vehicles' loads to truss girder support systems; deck surfaces were flat and carried local loads. After World War II, engineers designed deck surfaces as part of the support structure, creating a composite deck structure.

"We knew a membrane structure was the most efficient means of weight distribution, but there was no record of it being used in either civilian or military bridge structures," Ms. Kominos said. "We also needed some means of stiffening the membrane structure." Her concept used a curved membrane stiffened by opposing curved shells to form the deck surface; this structure would reduce weight of the bridge by eliminating the bridge deck's top cord. "Our computers didn't have a finite element program with curved elements, so I went to George Washington University and verified my data on their computer, which showed that a class-70 vehicle could theoretically be supported by my design."

Ms. Kominos took her concept to David N. Faunce, Support and Facilities Directorate, R&D Model Fabrication Division, to have a model made. "We used our new computerized milling machine to make the model," Faunce said. After preparing the program, it took six hours to mill the finished design, which will be tested later this year.■



Sizing Generators By Computers

Equipment developers soon will be able to use computers to size electric generators for their systems. Engineers in the Power Systems Assessment Office, Troop Support Command, Belvoir (Va.) Research and Development Center, are developing a standard for generator selection that will use a computer to determine electric power requirements under various operating conditions.

The program uses system load data, like electric motor starting and running characteristics to provide a readout of system operation in various scenarios; i.e., system maintenance, standby, training, and alert. Each item of equipment is assigned one or more service factors, according to the probability that it will be used in each scenario; the computer calculates power and phase angle and predicts the total power requirement for each scenario; the scenario requiring the highest power determines the generator size for the system.

Previously, Army users used individual techniques for selecting generators. This new method can be used for any tactical power system.■

Policy Strategy and Results Improve Navy Spares Acquisition

J.J. Genovese

There is a public perception that government procurement personnel were doing some pretty dumb things that resulted in wasting taxpayers' dollars. While "horror stories" centered around common items, like the claw hammer, stool cap, coffee pot, refrigerator, etc., there was a tendency to believe that similar stories existed for more complex and costly items. These stories, combined with allegations that our purchasing systems did not work reliably and that we were accepting supplies of inferior quality, raised significant concern in the public sector and in the Congress. One direct result was action taken by the Congress to legislate procurement reforms to increase significantly the number of procurements made on a competitive basis.

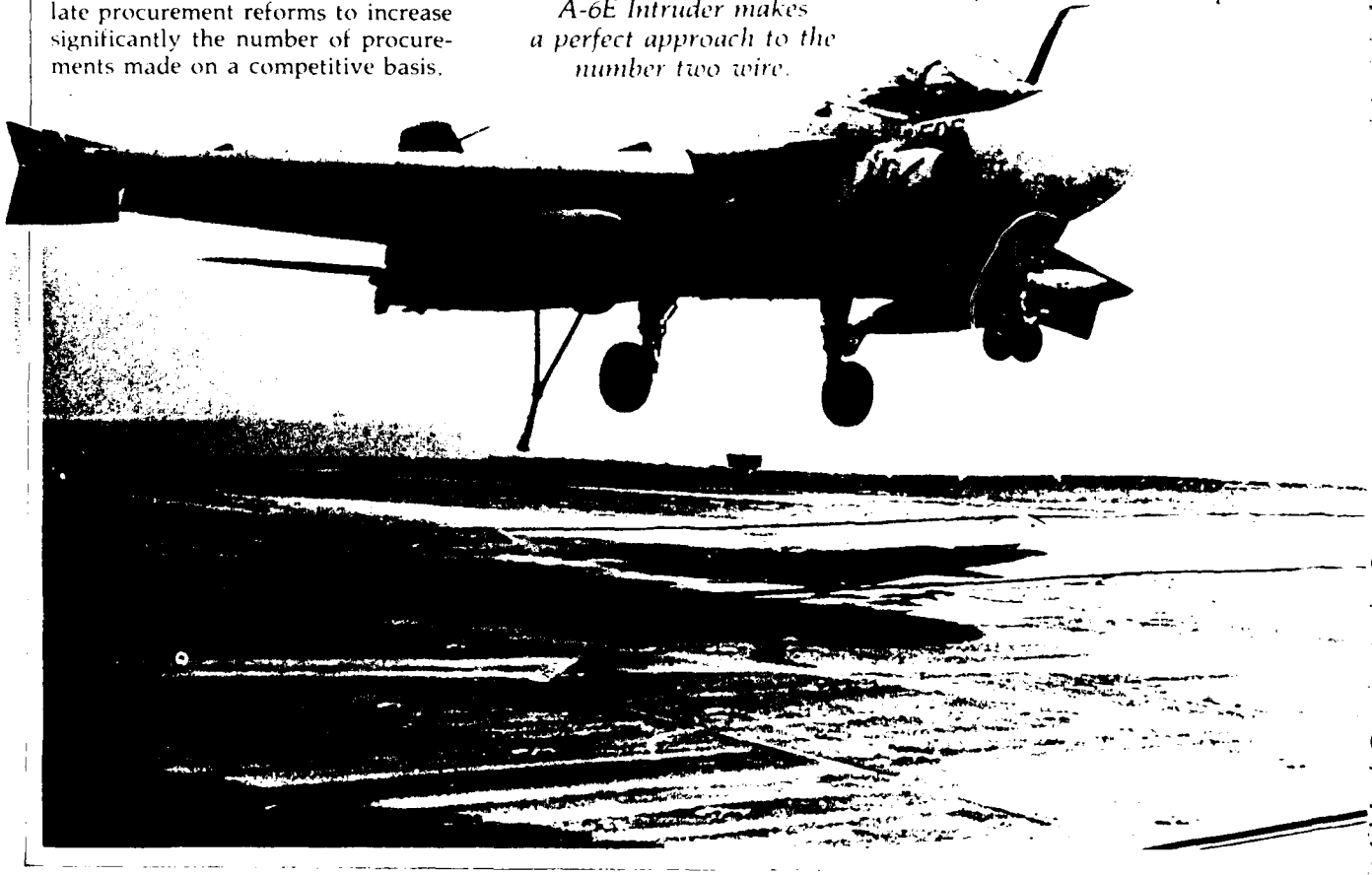
The Navy response was, and continues to be, characterized by candor and, most importantly, an "all hands" commitment to take immediate actions to revise our practices and procedures; also, to restore public and congressional confidence in the Navy procurement system. This commitment included strong policy direction and involvement by Secretary of the Navy John Lehman, and the allocation of enough manpower and funds to ensure corrections would be permanent.

The Facts

While public perception continues to be that our procurement personnel caused many of the "horror stories," our investigation revealed this to be inaccurate. The $600 toilet seats and the $16,000 refrigerators dominate headlines but are, in fact, isolated cases and often are a distortion of facts. (The Navy did *not* buy a $600 toilet seat.) Another public perception that defense industries rip off taxpayers is an unfair representation of facts.

The first fact to remember is that we do not have, nor would it be prudent to employ, enough buyers who are totally familiar with each purchase.

A-6E Intruder makes a perfect approach to the number two wire.



When the Navy broke out a piece of avionics for the A-6 aircraft to competition on a "form, fit and function basis," the unit cost was reduced 79 percent, the technology was newer, and $2.3 million cost avoidance was produced on the instant buy.

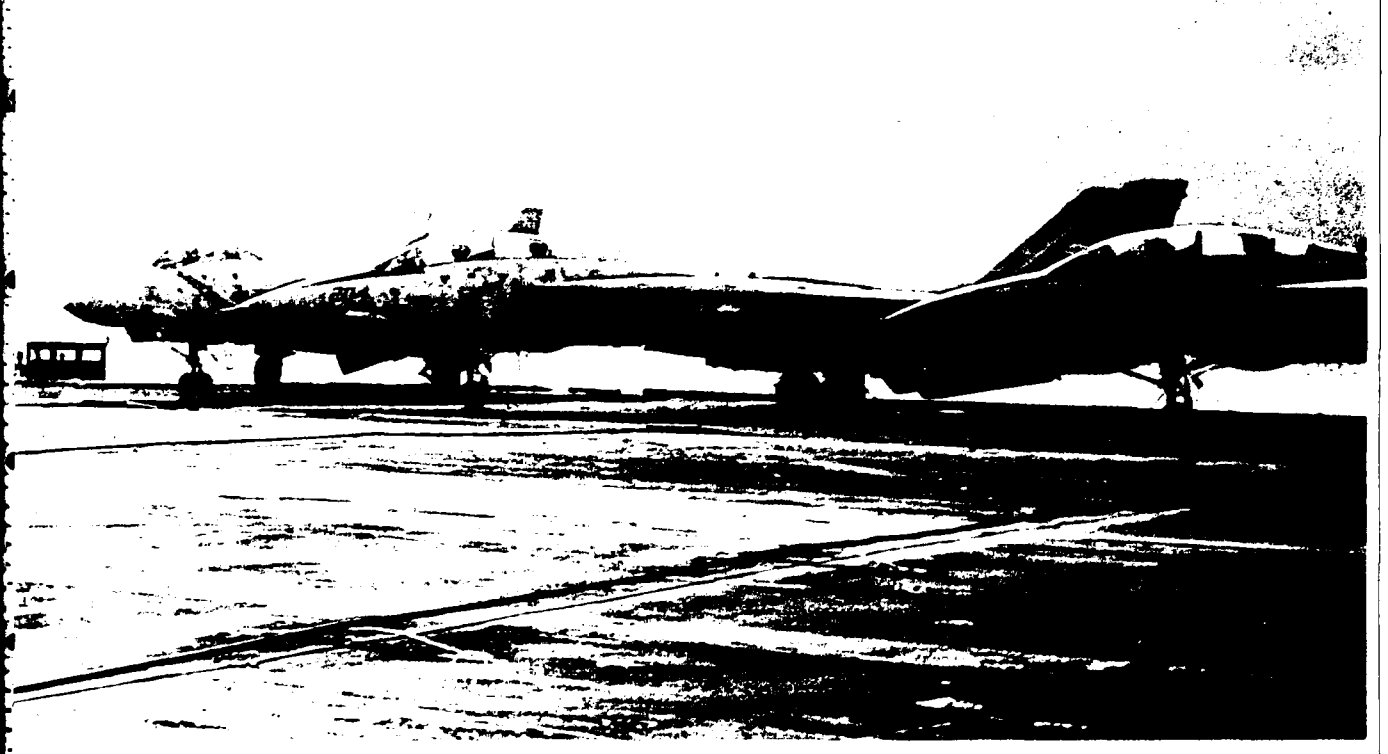
During fiscal year 84, Navy procurement activities made over three million purchases of spare parts, general supplies, and services, ranging from hand tools to critical parts for nuclear-powered aircraft carriers and submarines.

Secondly, although we have introduced automation to speed the whole procurement process, our present computer systems do not provide the quality of service needed to preclude "horror stories." We find that the basic cause for a "horror story" can often be traced to over-reliance on computer files for pricing information, or lack of an accurate description of the item being procured.

Thirdly, most businessmen supplying parts to the Navy are honest. They have sold us exactly what we ordered at a fair price, and the overall level of quality is high.

We in the government and our counterparts in industry have been shortsighted in underestimating the ability of the competitive marketplace to supply the high quality parts we need in a timely manner *and* more efficiently than in a sole-source environment. Navy technical and logistics personnel had adopted a conservative approach to buying spares; this calls for continuing, without question, the supplier/customer relationship with a sole vendor for many of our parts. Many industrial firms and associations have the attitude that "only I can sell you *the right part for your weapons systems*, because I am the prime contractor." This attitude in government and industry can stifle innovation, as was illustrated when the Navy broke out a piece of avionics for the A-6 aircraft to competition on a "form, fit and function basis." The winning supplier used the latest technology (technology used by the previous sole source was 20 years old) and reduced the unit price by 79 percent; this produced a $2.3 million cost avoidance on the instant buy.

Solving problems in spares acquisition involves both physical and attitudinal changes. The secretary of the Navy approved the resources needed to provide additional procurement and technical personnel to those commands with the mission to manage and procure spares. Resources are being in-



Resources are being invested to improve our computer systems so that we can provide more timely, technical, and pricing information to our procurement personnel.

vested to improve our computer systems so that we can provide more timely, technical, and pricing information to our procurement personnel. More importantly, however, is the leadership provided by the secretary of the Navy. There has been a clear shift in policy emphasis from an attitude of "Get it fast," with cost a secondary consideration, to "Compete it, whenever it makes good business sense to do so." Top management's strong support for competition is a clear signal to the Congress, and to industries providing weapon systems supplies and services to the Navy that competition is the preferred procurement strategy.

To supplement the emphasis on competition, a tough policy concerning breakout review was implemented while reiterating the long-standing policy to use the Federal Supply System whenever possible to satisfy requirements. Executing these policies throughout the Navy presented formidable obstacles that could not have been overcome without equally clear management direction from the heads of our biggest buying activities. The Navy systems commanders adopted different management strategies to accommodate their unique organizational technological business environment; however, they shared the common objective of using competition as the preferred procurement method.

Management Strategy

The guidance and support from top management was translated into concrete action through Project BOSS (Buy Our Spares Smart), which is the Navy-wide program to attack and improve all aspects of spares acquisition. The responsibility for managing the Navy spares competition program and Project BOSS belongs to the Naval Supply Systems Command (NAVSUP). To ensure that concepts of BOSS are "institutionalized" throughout the Navy and will survive the test of time, NAVSUP has evolved a set of management strategies with the following objectives in mind:

—Integrating the major initiatives related to improving spares acquisition into a coordinated program (BOSS).

—Improving the communication links between engineering technical personnel responsible for spares design and quality and the supply/procurement personnel responsible for spares procurement/competition.

—Convincing industry of its role in helping to solve the problems and encouraging specific action on its part to improve spares competition.

Accelerating the introduction of technology into those spares acquisition functions that can significantly benefit in terms of reducing administrative lead times and improving accuracy.

—Incorporating the acquisition reforms stemming from the BOSS program into the normal organization (institutionalization).

Successful implementation of these strategies over the long term requires changes to the traditional sole-source mindset, and organizational changes as well. Therefore, a program management office (PML550) was established at NAVSUP to express the strategy in terms of specific initiatives and to be accountable for results from these actions. The PML550 was created in October 1984 by consolidating the organizational elements, which had initiated various pieces of the BOSS program, with the advanced logistics technology effort which preceded BOSS. In this way, we now have cradle-to-grave coverage of major initiatives affecting spares. The PML550 has the job of building on the successful first year of BOSS, which is summarized here.

Results

When BOSS was conceived in August 1983, many skeptics felt the name—and what it stood for—would fade into the oblivion of good ideas overtaken by later crises. Nothing could be further from the truth. Much progress was made during the first full year of BOSS; i.e., integrating its major initiatives to focus on the goals of substantially increasing breakout efforts, enhancing competition, assuring that prices are reasonable, and accelerating the use of technology to help Navy technical and procurement personnel. The communication between the technical and logistical communities has been promoted significantly at all levels of management, and the results can be seen in the increasing momentum of the breakout program. Progress toward the third strategic objective of "bringing industry on board" can be seen in the many breakout candidates identified by our suppliers and their willingness to identify actual manufacturers to our buyers.

The initiatives undertaken in the name of BOSS produced fiscal year 84 cost avoidances of $193 million—more than five times the $35 million invested in the project. The following paragraphs summarize specific accomplishments that contributed to overall results.

Breakout: Navy Inventory Control Points (Aviation Supply Office (ASO) and Ships Parts Control Center (SPCC)) in conjunction with the Hardware Systems Commands (NAVAIR, NAVSEA, and S&NWS), broke out 3,431 (66 percent) of the 5,189 sole-source replenishment spare parts subjected to a full screen breakout review.

■ *Mr. Genovese is the program manager spares competition and logistics technology (PML550).*

Our "22-cent solution" involves an initial "letter of persuasion" to contractors whose proprietary legends are suspected to be in error.

Cost avoidances of $119.4 million were achieved as a result of ASO and SPCC fiscal year 84 procurements of parts that had previously been broken out.

Cost avoidances totaling $35.4 million were achieved by performing limited screen reviews of interim support material, purchasing common-use material from the actual manufacturers and using Navy organic production in lieu of new procurement to satisfy certain requirements.

There have been unexpected positive effects of breakout beyond the obvious one of greater competition. One is the innovation fostered by competition as is illustrated by the avionics example cited earlier. Another is decreased *production* lead times in some cases, because either a new competitor has shorter backlogs of orders or the administrative lead time of the "middleman" is eliminated.

Competition: Of particular significance is the more than 100 percent increase in the combined competition rates of ASO and SPCC, who buy the preponderance of Navy spare parts (fiscal year 84 rate of 28.7 percent and fiscal year 83 rate of 13.5 percent). This doubling of spares competition is a reflection of a successful breakout effort and close cooperation between the technical and logistics communities.

An active and effective competition advocacy program throughout the hundreds of activities comprising the Navy Field Contracting System (NFCS), yielded a fiscal year 84 NFCS competition rate of 46.8 percent, which is a significant improvement over the fiscal year 83 rate of 32.4 percent. Cost avoidances of $12.7 million were reported by NFCS activities (less ASO and SPCC, whose cost avoidances are recorded under breakout). Additional cost avoidances totaling $1.5 million were recorded by hardware systems commands who competed interim spares.

The average price reduction across nearly 1,000 items broken out and competed during fiscal year 84 was in excess of 25 percent. The effect of increasing competition is illustrated by the case of an in-flight refueling nozzle, which had been bought sole source for years, with the last sole-source price being $1,100 each. A technician at the Aviation Supply Office knew that other vendors were on a qualified products list (QPL) for a similar part and he acted to help those vendors qualify their products. At the time of the next buy, one of two prospective new suppliers had qualified, and competition between the former sole source and the new supplier reduced the unit price to $495. By the time of the next buy, the second new vendor was also able to bid, and three-way competition produced a unit price of $395. *Competition does reduce prices!*

Assure Prices Are Reasonable: Other BOSS actions included challenge of specifications and requirements, purchase of more economical quantities, performance of intrinsic value analysis, reporting instances of suspected overpricing, and requesting refunds. These initiatives yielded cost avoidances totaling $24 million.

Two of the most successful aspects of BOSS were PRICE FIGHTER and the Pricing Hot Line. PRICE FIGHTER, created in December 1983, comprises engineers and pricing specialists who perform intrinsic value (should cost) analyses and provide target prices to buyers. The support furnished by this team adds a new dimension to the technical information available to procurement personnel.

The Navy pricing hotline, established in 1979, experienced a tenfold increase in business. Such an overwhelming response from our fleet customers shows that the BOSS message is understood at all Navy echelons. Many of the calls reveal file errors, which produced an erroneous price to the customer even though the procurement price was reasonable. Two separate calls from uniformed personnel did result, however, in refunds from contractors of nearly $100,000; and a report from a civilian aircraft maintenance technician resulted in a $68,577 refund.

Blueprint for the Future

The strategic objective of accelerating the introduction of technology entails breaking new ground in areas such as those listed below:

—*Technical Data.* Missing or inadequate technical data is the major impediment to breakout and competition. This problem is being attacked "up front" by encouraging program managers to buy data at the appropriate time during weapons system acquisition. The PML550 reviews acquisition plans to ensure that, as a minimum, an option to buy appropriate data is included. We are validating the data before final delivery to the Navy and ensuring that a system for updating this technical information is in place. For weapons systems fielded before BOSS, purchase of selected data with BOSS resources is done when the potential return is high. Technical data covering over 2,000 line items from 11 weapons systems were purchased in fiscal year 1984. Finally, we are actively challenging proprietary legends to obtain the right to use all data for which the government has paid. Our "22-cent solution" involves an initial "letter of persuasion" to contractors whose proprietary legends are suspected to be in error. These letters do not involve formal legal processes but have yielded over $12 million in annual buy value of material for which the cognizant contractor agreed to remove all restrictions immediately.

The Congress and auditors have served notice that they expect us to see innovative approaches to acquiring spares and other materials.

- *Reverse Engineering.* When complete technical specifications are not available and the annual buy value of an item is high, reverse engineering will be used as an alternative means to acquire reprocurement data suitable for competition of future requirements. This solution is already used to some extent by ASO in conjunction with NAVAIR engineering activities. In support of recent congressional and DOD direction concerning use of commercial contractors for reverse engineering, we are developing a pilot contract with a commercial firm to reverse-engineer several marine pumps and compressors.

- *Excessive Design Requirements and Specifications.* The Navy has begun a review of the design and specifications of such low-technology items as aircraft seats and ladders, personnel accommodation equipment like galley gear and habitability material, hand tools, and aviation and non-aviation support equipment. This effort, known as SPEAR (specification evaluation and reduction), supports the initiative of Deputy Secretary of Defense William H. Taft IV to eliminate any actual or apparent "goldplating" of material procured by the Department of Defense. The goal is to identify those items whose design or specifications exceed reasonable performance and safety standards. In cases where modifications to design or specifications are cost effective, the cognizant engineering activity will be asked to make the necessary changes. In the interim, all items in the categories mentioned above will be priority candidates for breakout screening.

- *Automation of Data Repositories.* Installation of the engineering drawing management information and control system (EDMICS) at the Naval Air Technical Services Facility is the first step in the automation of the Navy's eight primary data repositories. This automation is a necessary step to store and access effectively the many technical specifications essential to the competition of an increasing proportion of Navy procurements.

The institutionalization of these and other ongoing initiatives is being promoted by setting goals and monitoring results. The latter is fulfilled through quarterly program reviews at each of the major commands vested with responsibility for the breakout and procurement of spares. Finally, personal accountability has been established through performance objectives concerning competition, pricing, and breakout in the personnel appraisal systems of employees involved with these functions. The ultimate proof of institutionalization will be the disestablishing of PML550 and incorporating all BOSS initiatives into the existing organizational structure of Navy activities.

Summary

Though we accomplished much in fiscal year 84, there are many challenges in the years ahead. Breakout and competition goals will be raised yearly. The use of competition forces a major change in the way many people have done business over the years and the pressure will not diminish.

Resources to maintain the momentum of BOSS have been programmed to rise from the 550 end-strength and $35 million allocated in fiscal year 84, to over 1,100 end-strength and more than $100 million in fiscal year 88. This level of investment guarantees high interest in the program, and close scrutiny of the results.

The Congress and auditors have served notice that they expect us to seek innovative approaches to acquiring spares and other material. The Competition in Contracting Act of 1984 and the FY 85 DOD Authorization Act codify many of the initiatives already undertaken to promote competition, identify actual manufacturers, procure in more efficient quantities, and challenge propriety data claims. The Congress has sent the message that we may not turn away from our plans. The auditors will closely monitor our progress to ensure that we meet our objectives. Our claims of savings are, and must continue to be, credible and auditable.

The enthusiasm and assistance of "all hands" during the first year of BOSS have brought us a long way. We have the involvement of sailors on our ships to report suspected overpricing. We have the commitment of top management to support our internal reforms and unhesitatingly tell their corporate counterparts that industry must help us make smart buys at fair prices.

The key to continued success is a liberal application of common sense and good business judgment. ■

Whenever in this publication "man," "men," or their related pronouns appear, either as words or parts of words (other than with obvious reference to named male individuals), they have been used for literary purposes and are meant in their generic sense. ■

Successful Manning of New Defense Systems

A system operated and maintained by PEOPLE must include them in its definition.

Dr. Jonathan D. Kaplan

What is the overall problem of systems acquisition? It is how an organization acquires enough systems to perform at required levels, in an acceptable period of time and for an acceptable cost, without significantly degrading the effectiveness of other systems being acquired.

To understand this problem you need a definition of "system," which, customarily, is this: A collection of hardware and software components able to function for a common purpose for a certain time. Unless totally automated, hardware and software components cannot function alone. It therefore follows that a system operated and maintained by *people* must include *them* in its definition. Since the people can not function adequately without specialized training, that too must be considered: the more inclusive definition of system acquisition would include *personnel and training acquisition*. Once a system is defined to include personnel and training, the system acquisition problem can be related to these components. At this detailed level of specificity, the acquisition problem can be translated into the following manning problems:

—How can system designs be influenced so that hardware software components can be operated and maintained at acceptable levels by realistically available personnel with realistically available training?

—How can hardware software component designs be evaluated to determine types of personnel required to

Originally developed in 1973, the HAWK air defense missile is undergoing product improvement particularly for maintainability. It includes 3 radars, an ADP control center with displays, and up to 13 platoons and 9 missiles.

The Stinger and other weapons that will end up in the hands of the smallest of combat units, must be designed so that in battle its usefulness does not depend on a highly trained operator being available.

operate and maintain at required levels, availability of required personnel, alterations of system design to improve personnel availability, costs of adequate manning, and effects of adequate manning on effectiveness of other systems being acquired? A method is required to aid each of the above problems.

Influencing Hardware and Software Design (The Predesign Phase)

The proposed method to influence hardware software design (providing greater manning potential) consists of developing detailed system performance requirements and general operational maintenance personnel descriptions; passing this information to hardware software designers; and requiring that the resulting design be capable of that performance with those personnel. This information, then, tells the designers: the type of required performance, conditions under which the performance will take place, criteria by which successful performance will be determined, and difficulties personnel had previously with performance; and, significant information about people operating and maintaining the hardware software.

System Performance

Development of system performance requirements involves producing a front-end-analysis based on overall system performance, rather than an allocation of functions and tasks among system components and subcomponents. The purpose is to influence a hardware software design not yet made. Therefore, an existing design or prototype cannot be the basis of the front-end-analysis driving the requirements. Allocation of functions tasks among hardware, software, and personnel components, before initial design, introduces an undesirable constraint on the design process. The designer needs to know criteria of system performance required and personnel abilities, constraints, and previous problems affecting those criteria. With this information plus knowledge of the current state of applicable technology, the designer can determine how best to allocate functions and tasks to reach their required performance criteria. Therefore, the front-end-analysis should deal *only* with system performance as a whole. A detailed account of a concept for developing a front-end-analysis before system design may be found in *A Concept for Developing Human Performance Specifications* (Kaplan & Crooks, 1980). Once developed, its products (performance elements and conditions at criteria) can be used to identify performance data from functionally similar systems. The performance data of interest in this context consists of performance (particularly inadequate performance) of soldiers in functionally similar systems. This data gives designers cues to hardware software solutions that were (and will be) unsuccessful.

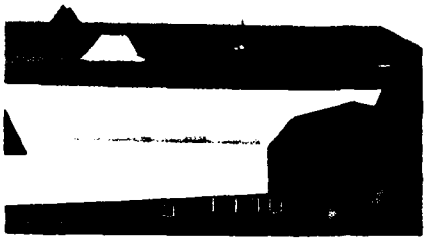
Personnel Information

The primary purpose for developing information about a system's people is to ensure that the hardware software design integrates successfully with them into a system capable of required criteria of performance. Systems composed of components that interact must be designed or selected to fit together. This is the most difficult problem in designing a complex system. Human operators and maintainers have a limited range of aptitudes and physical characteristics; as such, they may be thought of early in the decision process as fixed components of a system. When one system component is fixed, designs of other and unfixed components must consider characteristics of fixed components. For this to happen, fixed components' characteristics must be known by designers of unfixed components. *System designers must know characteristics of the proposed operators and maintainers.*

To influence hardware software design by making it compatible with characteristics of appropriate personnel, we must first identify those people. Since the hardware software has not been developed at this phase, the problem is not to identify personnel characteristics required by such a design, but to develop a design that the right people can operate and maintain. The two procedures for identifying probable personnel of a system before the design of hardware software are *comparability analysis and availability analysis*. Both manipulate a proposed human characteristics data base, but attack from opposite positions.

Availability analysis has the same desired ends as *comparability analysis*; that is, to identify significant characteristics, including crew sizes, of probable personnel so they can integrate successfully with hardware software designs. Availability analysis means and philosophical set are different; i.e., which group will be assigned to a system. Is it people in an applicable and current military occupational speciality (MOS), or people available because they were not assigned to other systems? *Availabil-*

To cut costs of live practice, MI gunners practice in the Conduct of Fire Trainer including computer-generated imagery. Effectiveness of the training depends totally on abilities of the trainee.



ity analysis is based on the second alternative.

Comparability

In comparability analysis, functionally similar systems are selected to identify operator populations; probable maintainer populations are identified by finding existing systems likely to have similar hardware/software components and configurations.

When identified and designated (using MOS), significant characteristics are obtained via a personnel characteristics data base accessed according to MOS and skill level. Next, we use the characteristics data base to estimate the number of people (with characteristics mapped from the appropriate MOS) who will be available when the system is fielded. We can now estimate operations and maintenance crew sizes. Once personnel characteristics are identified, they are held constant, and crew size becomes the unknown to be determined by using the data base.

Availability

In availability analysis, the Army population is projected for the period of system fielding, and all personnel assigned to other systems are subtracted. A factor estimating administratively unavailable personnel is subtracted. This factor refers to training, transients, holdovers, and students (TTHS). The remaining population, with estimated characteristics, is available to operate and maintain system hardware/software. The personnel characteristics data base identifies mixes of characteristics of the projected, available population. Total personnel size is held constant, and personnel characteristics are the unknowns being identified by using the data base.

Evaluating Designs for Manning

It is one thing to influence a hardware/software design to integrate effectively with personnel characteristics; it is another to evaluate that design to determine how effectively it can be manned. In the evaluation phase, we must find the actual personnel and crew-size requirements of a hardware/software design to determine:

—Types of personnel required by hardware/software design

—Whether an adequate number of such personnel will be available

—Whether effects of training and/or interface-design improvements will permit adequate manning

—To what extent system performance requirements could be lowered to permit adequate manning

—Monetary costs to man the system

—Effects of manning the system in question as opposed to manning (therefore the effectiveness) of other systems being acquired.

—Personnel characteristics and/or types in short supply.

The core of manning evaluation is the ability to predict the number and type of people required by a hardware/software design, and how many people would be available. There are two ways to do this: Select appropriate MOSs and find personnel available in those MOSs, select characteristics and levels required, and then predict the personnel available with the required mix of characteristics at those levels.

MOS-Based Design Evaluation for Manning

A military occupational specialty is a job category defined by required tasks and may be directed toward specific hardware, generic hardware, or, it may be functional (i.e., infantryman).

To apply an MOS-based design evaluation, first it is necessary to identify functions and tasks required to operate and maintain the hardware/software. These requirements are matched to equivalent tasks/functions that define existing, potentially applicable MOSs. The extent to which the required tasks/functions *match* the existing tasks/functions indicates the likelihood that the MOS in question is appropriate for that design. Operations and maintenance MOSs are then selected, and the front-end-analysis and hardware/software design are used to determine the size of operations and the size of maintenance crews; personnel available are determined for the selected MOSs; these are applied to a prediction model for years the system will be fielding; and, MOS population sizes are estimated. Now, the population sizes of the selected MOS are compared with the number of people required to man the system.

The Black Hawk replaces the UH-1 "Huey," carries twice the payload, is 42 knots faster, and much safer. It is advertised as the easiest helicopter in the world to maintain.

The MOS-based evaluation method is simple to implement and probably would be easy to use. Its adequacy is based on four assumptions:

--Personnel assigned to an MOS are capable of performing constituent tasks at an acceptable level.

-- The new weapon system requires, roughly, the same tasks as does the MOS in question, and are to be performed at the same or lower criteria than the MOS now requires.

-- Tasks defined for the system and appropriate MOS have been described at a measurable level permitting meaningful matching.

There are no significantly large numbers of personnel outside the matching MOS having the appropriate characteristics required for adequate task performance.

Mostly, these four assumptions are incorrect or undemonstrable; therefore, MOS-based evaluation can be used for so-called "quick and dirty" estimates, but should not prevent development of more methodologically sound approaches to hardware/software manning evaluation.

Personnel Characteristics Evaluation

A personnel characteristic is a measurement result used to predict performance. It is possible to predict performance from measures at the physiological level (e.g., strength, visual acuity, reaction time), measures at the aptitude level (spatial relations, abstract reasoning), and measures at the decentralized task level (target acquisition tracking, inputting data). The crux of difference is their relationship to training. On the one hand some characteristics are enduring and interact with training to predict performance; on the other hand, some characteristics are altered by training. We would like to have sufficient data to make performance predictions from both characteristics. In the absense of such an ideal situation, the assumption is that characteristics used for prediction will be of the enduring type and will consist of both physiological and aptitude measures.

To apply a characteristics-based design evaluation for manning, we must determine what characteristics, and their levels, are needed to perform the functions tasks called for in the system performance requirements as implemented by the hardware/software (in the design). In addition, we must determine the characteristics, and their levels, needed for the performance of functions/tasks performed by personnel without the use of system hardware/software.

Once determined, it is necessary to select the required numbers of personnel to operate and maintain system hardware/software as designed. In general, this is done by requiring the designer to state the maintenance and operations crew size per system, or by an independent process of analyzing design elements according to performance requirements and clustering the resulting soldier and soldier-machine tasks into functions and jobs. Overall soldier populations required are computed by multiplying the operational and maintenance crew sizes by the required number of systems per unit time.

When characteristics and levels, plus required personnel and years of fielding are known, the information is applied to a predictive characteristics data base. The result is the percentage of the required soldiers, with required characteristics, that will be available at the right time. If results yield a deficit in available personnel, characteristics and levels producing that deficit are provided.

If the required soldiers with the required characteristics and levels will not be available, alternative and complimentary analyses are developed. The purpose is to determine whether there are action or actions that will permit using personnel with lower characteristics levels, thus enlarging the potential manning population.

Three types of analyses aid in determining whether the manning population can be enlarged: training analysis, interface function allocation, and performance requirements analysis. In the case of training and interface, the general procedure identifies deficit-producing-characteristics, determining the effects an enhancement (training or interface allocation) would have on required characteristics levels, and re-entering the characteristics data base to determine availability. Performance requirements analysis would be run if the first two could not eliminate the manning deficit completely; in this case, original performance criteria are questioned by generating alternative criteria, selecting the best criteria that can be manned (determined by recycling the full manning method), and comparing them with mission-area deficiencies that

The TOW anti-tank missile system is designed to destroy enemy tanks and thereby lessen the quantity of their threat. A computer in the launcher adjusts for errors in aim. Used with the armored vehicle, or ground-mounted, the TOW uses modern computer technology to simplify rather than complicate training required of military personnel.

drove the original performance requirements.

When the possibility and requirements for system manning have been made, another level of analysis is performed that predicts the effects of manning the system on the Army as a whole. The two types of effects analyses are *dollar-cost analysis*, and *effects on manning other systems*. Dollar-cost analysis estimates costs of manning the system including training, interface redesign (if any), and acquiring required, selected personnel. Effects of manning on other systems keeps a running total of personnel types who will be assigned to systems being fielded for time in question, and determining whether that system will use personnel who have been assigned to other systems. The product is a description of the conflict, or lack of conflict, among systems for the acquisition of personnel with specified mixes of characteristics and personnel characteristics in short supply.

A Data Base of Personnel Characteristics

The descriptions of design influence and evaluation require using a data base of personnel characteristics. No such data base exists. I will give a description of a concept for such a data base, which will consist of three major components: MOS-characteristics map, analysis-characteristics map, and population predictor. These interact to aid the design influencing, as well as design evaluation procedures.

MOS Characteristics Map

This component is used to enter the characteristics data base when comparability analysis is the technique for design influencing. This previously described analysis consists of influencing the hardware/software design process by selecting probable operator/maintainer MOS, determining characteristics of those populations and informing designers. These characteristics serve as design limitations of the soldier components of the system with which hardware/software designs will have to be integrated. To perform this function, the MOS-characteristics map will include a list of MOSs; each will access the significant personnel characteristics at relevant values or levels associated with it. Initially, these will be historical in nature; that is, characteristics and levels that recent MOS personnel have demonstrated. With further development a prediction model probably will be incorporated so that these characteristics and levels will be based on predictions for specified, future times. With this structure, users of the MOS-characteristics map wi" be able to enter the MOS produced by comparability analysis procedures and receive personnel characteristics at indicated levels for those MOSs. Such a map should have an additional use. By reversing the flow of the component, users could enter personnel characteristics at specified levels and receive candidate MOS with such personnel. This reversal would help users determine appropriate MOS after determining characteristics required to operate/maintain design to required levels.

Analysis Characteristics Map

This is used to identify required personnel characteristics and levels of those characteristics from analyses of required performance, hardware/software interface design, and training. It is used to enter the data base in the evaluation of the hardware/software design for manning. This component matches tasks performed under conditions with hardware/software interfaces, and maps the result to personnel characteristics. It then matches performance criteria, values of conditions (under which performance tasks place), and values of the hardware/software interface design (lift 50 lbs.) and maps the results to levels of personnel characteristics. This component contains data on the interactions of characteristic levels and amounts of specified training on the performance of classes of tasks. This information is used to trade-off amounts of training with levels of characteristics to arrive at the most cost-effective characteristics levels required by the hardware/software design to perform at the specified criteria. Although the primary use would determine required personnel characteristics and their

(See Manning, page 44)

■ *Dr. Kaplan is a research psychologist at the U.S. Army Research Institute for the Behavioral and Social Sciences.*

Integrating Facility Requirements

Into U.S. Army System Acquisition Programs

Colonel George R. Kleb, USA
Colonel Charles J. Sollohub, USA

The U.S. Army is in the midst of the most extensive force-modernization program ever undertaken in peacetime. It will issue more than 400 new systems to field commands during the next several years. Many—although they essentially replace current systems—are sufficiently different in performance, size, or maintenance to impose significant facility requirements on the using commands and training establishments. Some are completely new systems that impose new facility requirements from the ground up.

In this article we examine relationships among Army systems acquisition and facility construction processes to understand how they are coordinated; also, to determine whether we can improve interactions so that the facilities will be in place when systems are deployed. The basic process exists for anticipating, funding, and constructing new facilities to support new systems; however, since several new systems required facilities not anticipated, coordination actions may not be receiving enough emphasis, or may have fallen into disuse.

When the M-1 tank and the UH-60 helicopter arrived in Europe, some minor facility problems had not been anticipated. For example, the UH-60 required a different voltage power source for test equipment than did the UH-1 helicopter. The electrical power supply in maintenance facilities, therefore, had to be modified on short notice. Also, the M-1 tank would not fit in existing tank wash racks with its side skirts raised; again, expedited construction was necessary.

Planning for locating facilities for the PATRIOT air defense missile units and the multiple launch rocket system artillery units, and the programming, budgeting, and construction of those facilities, required extraordinary management activities to meet desired fielding schedules. Better coordination earlier in the system development would have reduced these problems and permitted orderly commitment of construction funds rather than requiring adjustment of priorities and reallocation of funds and effort, which actually occurred.

A "Perfect World" Possible

A perfect management world could exist to integrate facility requirements into Army systems acquisition and deployment. This would require that systems are developed and deployed incorporating facility requirements into planning efforts within prescribed management procedures; that effective interfaces exist and are exercised routinely among user, system acquisition, construction planning, and execution and resource management communities that ensure the required facilities are available; and that management processes governing environments are synchronized.

Further, it would presuppose that total life-cycle costs can be developed; that funds for system acquisition and development are not constrained; and, finally, that detailed management information is developed and provided to decision/review authorities for execution of responsibilities without uncertainty about program status, total life-cycle costs, and schedules.

Process Synchronization

To determine whether such a perfect world is possible, it is necessary first to determine if factors can be meshed to represent the ideal notion described. The system acquisition and construction processes might ideally be integrated. The planning, programming, and budgeting system (PPBS) cycle might generally overlie the other two "processes." The result leads to a conclusion that management processes can be effectively synchronized and forcibly implemented.

It is possible to compress portions of factors associated with the system acquisition system. The multiple launch rocket system's development program

When the UH-60 Blackhawk helicopter arrived in Europe, minor facility problems included a different voltage power source for test equipment than was needed by the UH-1 Iroquois.

was constrained in this manner: 60 months to initial fielding without serious impact on the programmed construction and facilities availability—albeit accomplished only with extraordinary management effort. Within reasonable bounds, therefore, synchronization of processes seems possible.

Integrated Program Execution

It is possible to maintain a check on system development at every decision point—either by the project manager and staff or senior echelons of authority—and perform detailed facility-requirements definitions. The integrated logistic support (ILS) system, as prescribed by DOD Directive 5000.39 or guidance as implemented by AR 700-124, establishes the methodology and mechanisms to guarantee the possibility of incorporating facility requirements planning into systems development and deployment.

The potential exists to exercise routinely an established organizational structure responsible to implement system acquisition, construction, and resource-management functions. The conclusion, after analysis, is that organizational elements do exist that might permit effective, integrated total-program execution.

Life-Cycle Costs

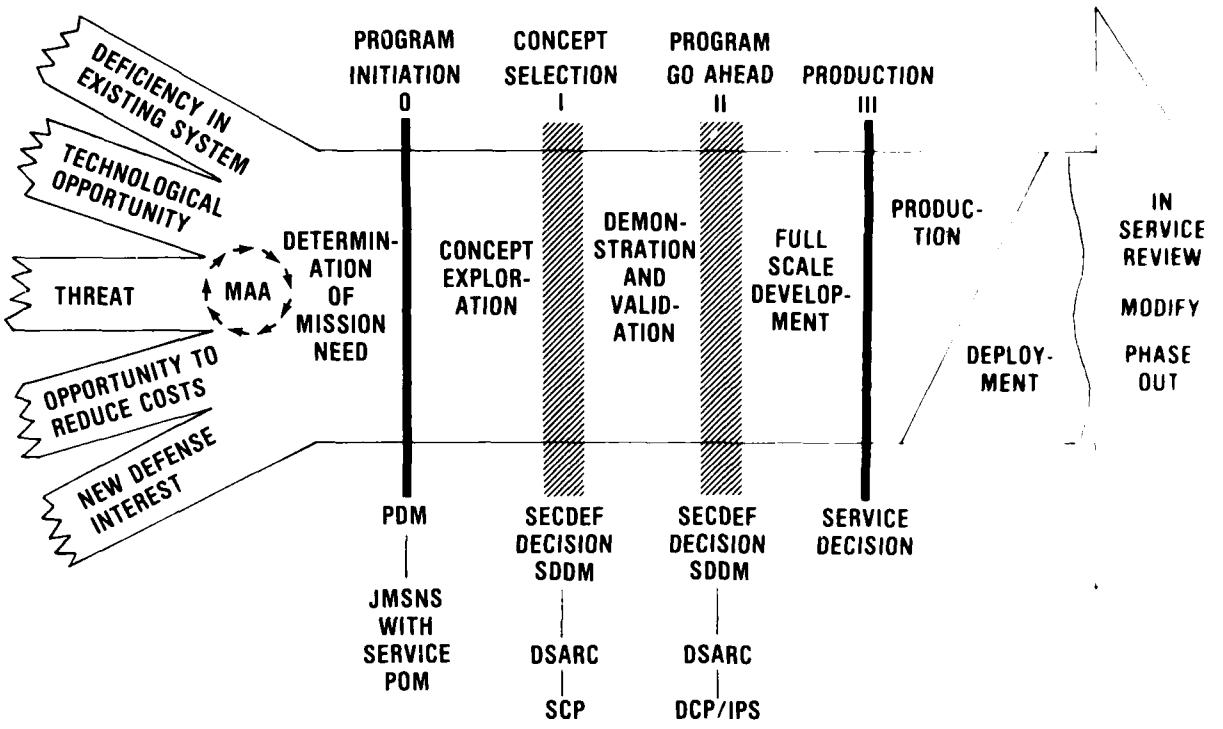
Establishment of the program-cost baseline and total life-cycle costs for systems integrated into the Army force structure would seem possible. Totally accurate costs may not be possible at the validation phase decision point, but estimates become more accurate as development and facility-requirement definitions progress. The potential for divergence from the perfect world is probably highest in consideration of this factor. Total systems cost can be lost even if the costs identified by the program manager are totally accurate for specific items; e.g., research, development, testing and evaluation, and procurement.

Management Information

Assuming all previous conditions exist and meet our "perfect world" criteria, management information must be available. Decision-makers need overall program integration information for overall Army program execution. This need can be visualized easily in an unconstrained funding situation. In a constrained environment, which includes all but the most critical system development fielding, this detail and timeliness of management information are even more crucial.

The Army planning, programming, and budgeting system has all the mechanisms established to provide data in reasonable form and depth for generally effective decision-making in an unconstrained or constrained funding environment. Management information systems for facility requirements planning and construction have been established for years. The interface documentation between any new system program manager and the engineer community, however, is only

Figure 1. Major Defense Systems Acquisition Process



now being developed in the necessary detail.

An Imperfect Reality

The potential for the "perfect world" does exist, provided all the assumptions occur. But, that "perfect world" never quite occurs because there are real-world roadblocks.

Inadequate ILS Definition

Obviously, the reality to integrate facility requirements with the Army system acquisition process is different from the "perfect world." The ILS evolving in the Army is not meeting the goal of the ideal facility-requirement process. Logistic support plans for major systems devote relatively insignificant effort to facility needs early in programs, and, in some cases, identify facility issues late.

Extraordinary engineer efforts have been instrumental to ensure reasonable beneficial occupancy dates for appropriate facilities. The multiple launch rocket system (MLRS) had a shortened development cycle and drastically needed excellent, early facility requirements definition. Histories of other systems' developments in the current Army modernization program reflect a similar basis for concern about potential for a "perfect world" in this respect; indeed, the extraordinary efforts required have stretched credibility in our long-range planning capabilities. That part of the ideal world does not exist and intense efforts may be required to bring the systems acquisition efforts into line with more efficient management requirements.

Lack of PM Awareness

Project managers are not aware of all the available engineer capabilities. Materiel fielding plans are being completed too late to highlight anything but critical, quickly fixed, small facility issues during fielding. The Office of the Chief of Engineers is developing facility support plans for systems that will effectively support project development from the perspective of the facility requirements. This should preclude the construction schedule from becoming out of synchronization with systems deployments.

Information Deficiencies

Facility support plans and detailed entries in the Army modernization information memorandum, modernization reference information system, and Army force modernization master plan do not exist for all efforts under "Army 90," much less unique systems under the Army systems modernization effort. Segments of the overall management information systems involved in the facility requirements interface with system acquisition and deployment are evolving in sophistication and detail.

Is "Ideal World" Worth the Effort?

If the ideal world does not exist, is it attainable, and is the effort worth it?

Organizational Interfaces

Effective interfaces exist but are not used routinely by the systems acquisition, construction planning and execution, and resource management communities to ensure that required facilities are available when needed. More efficient interaction among program managers, engineers or a facilities expert in the program manager office, and the Major Army Commands would be a welcome and relatively low-cost efficiency. From this early interaction should come an identification of the facilities issue as part of the total system development.

Table 1. Notional System Costs and Funding (5-Year Window)

BCE COST ("PRICE")			PPBS FUNDING		FUNCTIONAL PDIP FUNDING		PM's FUNDING	
RDTE		5	RDTE	5	RDTE	5	RDTE	5
Investment			Procurement		Procurement		Procurement	
— Nonrecurring	5		— WTCV	25	— WTCV	25	— WTCV	25
— Production	33		— AMMO	5	— AMMO	5	— AMMO	5
— Engineering Changes	5		— OPA 1	4	— OPA 1	0	— OPA 1	0
— Systems Management	2		— OPA 2	4	— OPA2	0	— OPA 2	0
— Initial Spares and Repair Parts	5		— OPA 3	2	— OPA 3	0	— OPA 3	0
— Other	5			40		30		30
— Operational/Site Activation		60	MCA	5	MCA	5	MCA	0
Operating			OMA	15	OMA	5	OMA	0
— Spares, Petroleum, Oils and Lubricants, Unit Training	10							
— Depot Maintenance	4							
— Modifications, Materiel	2							
— Other Direct Support Operations	2							
— Individual Support Operations	2							
— Military Personnel	15	35	MPA	15	MPA	15	MPA	0
Total		100		80		60		35

Figure 2. Military Construction Army Cycle (MCA) Processes

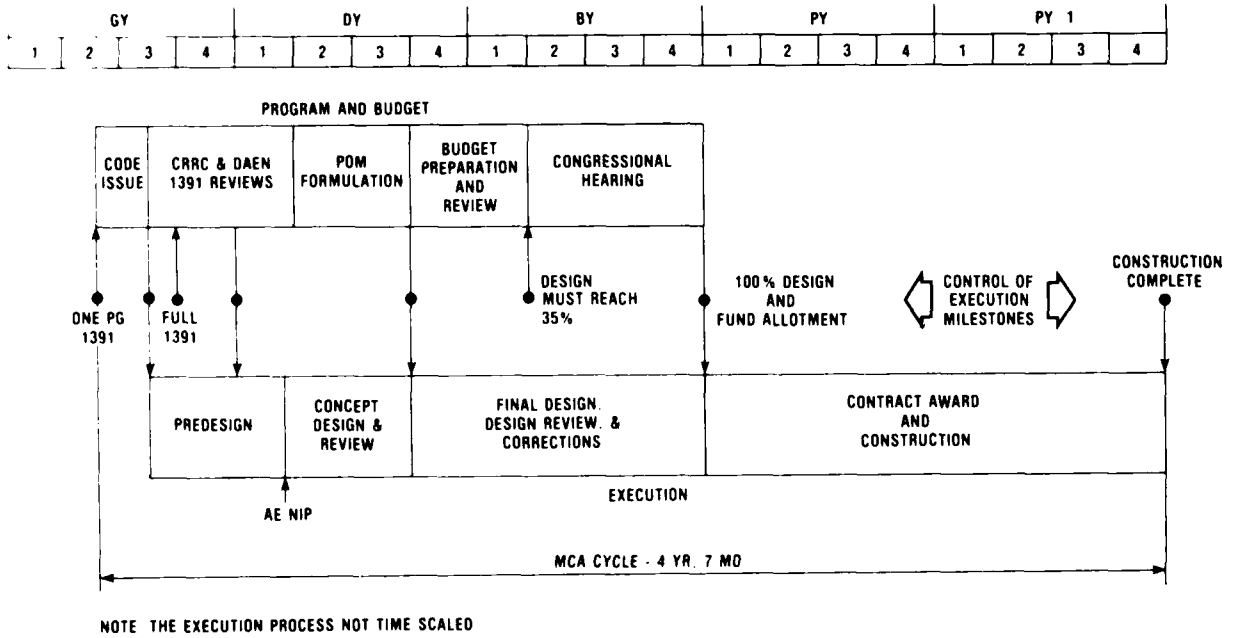


Figure 3. Planning Events or Documents Showing Principal Interrelationships—Army PPBS Cycle

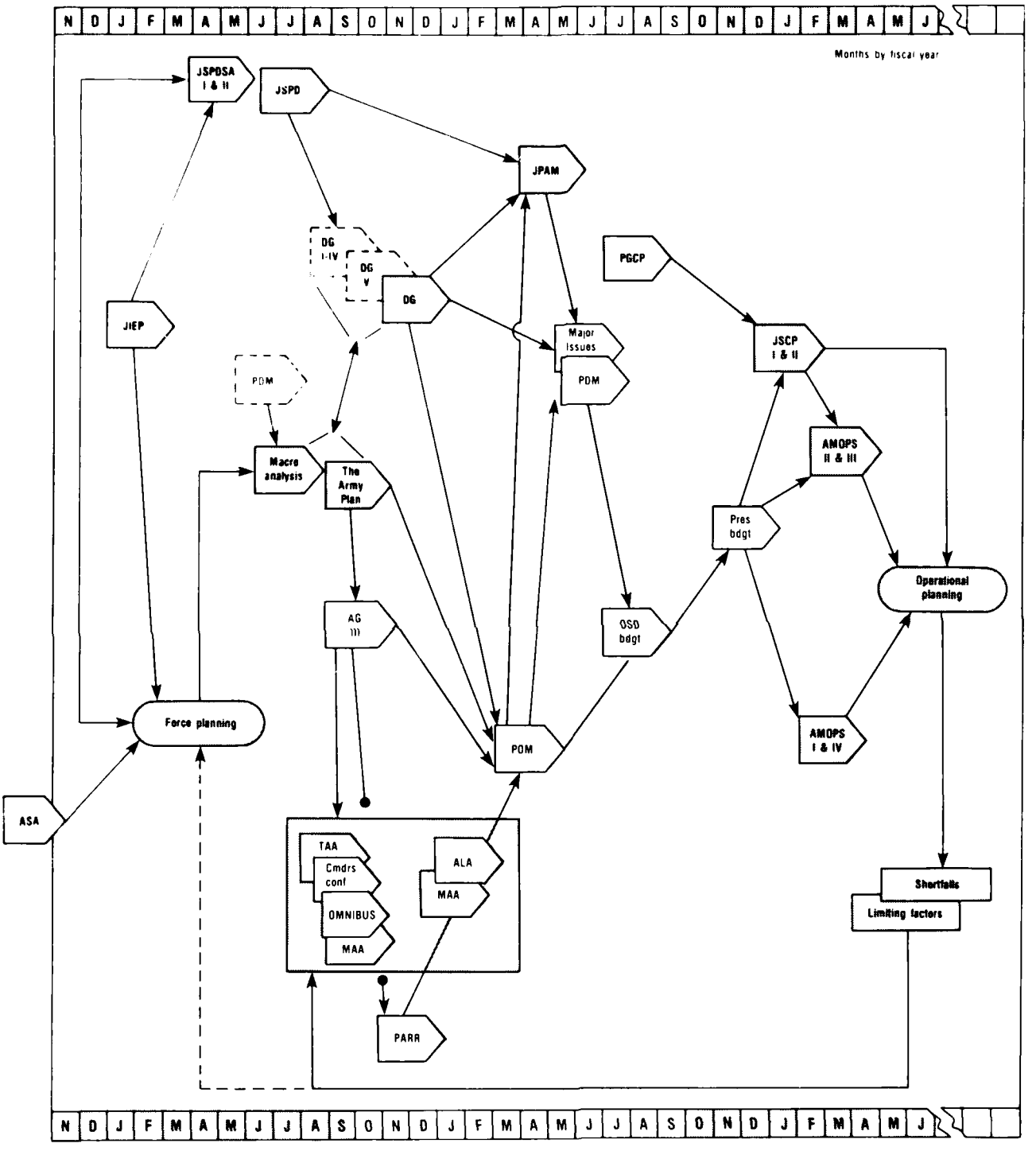


Figure 4. Programming Events Showing Principal Interrelationships—Army PPBS Cycle

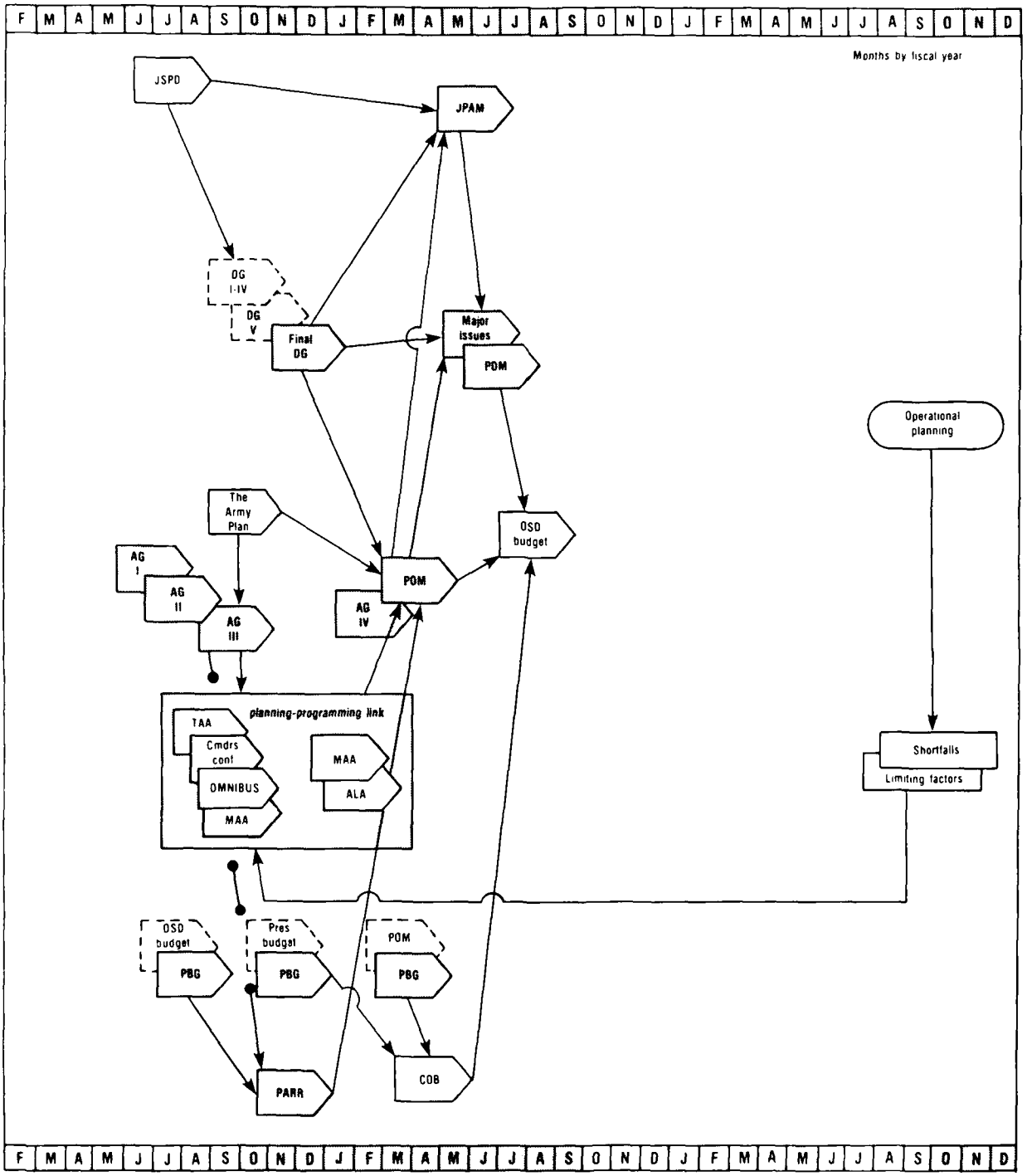


Figure 5. Budgeting Events by Budget Stage Showing Principal Interrelationships—Army PPBS Cycle

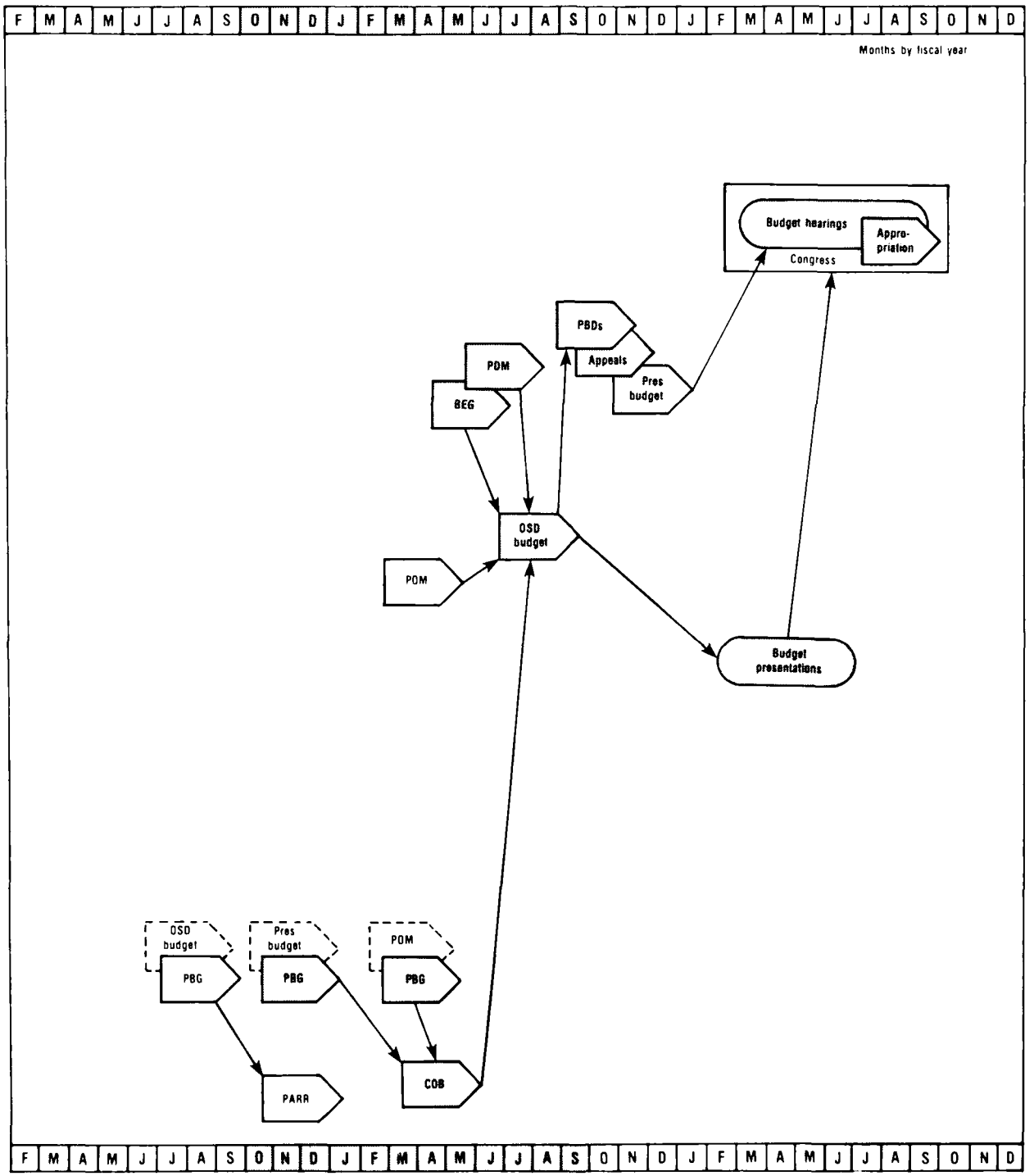


Figure 6. Ideal Management Interrelationships in Developing and Fielding New Systems

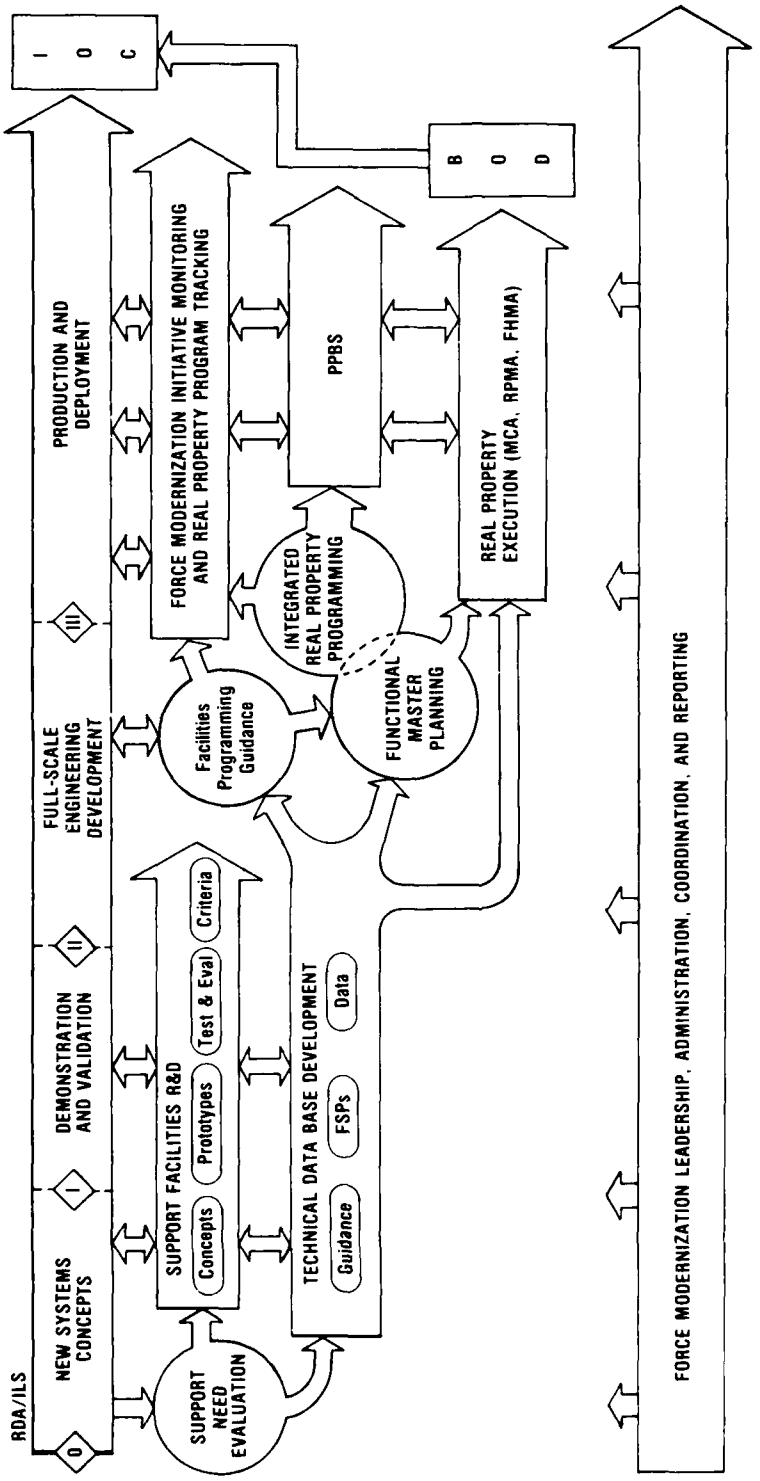


Figure 7. U.S. Army Corps of Engineers Force Modernization Facilities Support, Organizational Relationships and Responsibilities

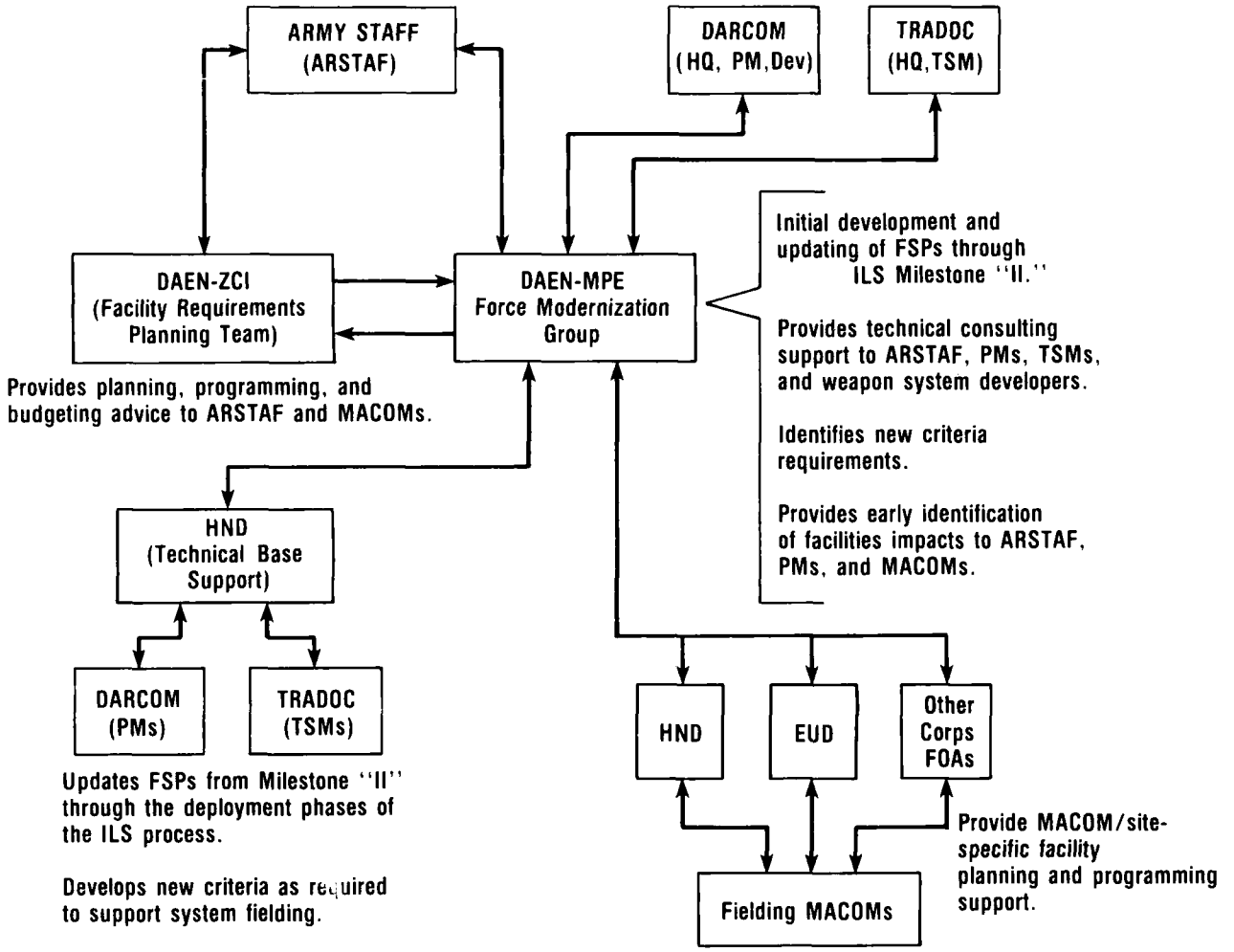
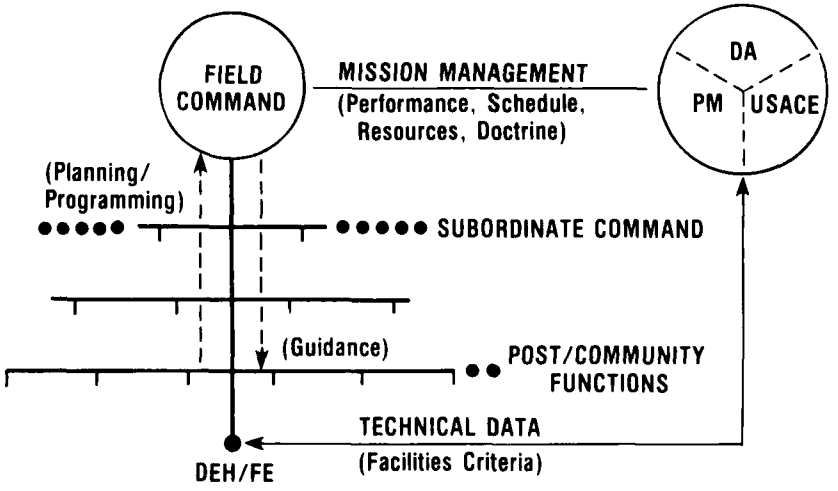


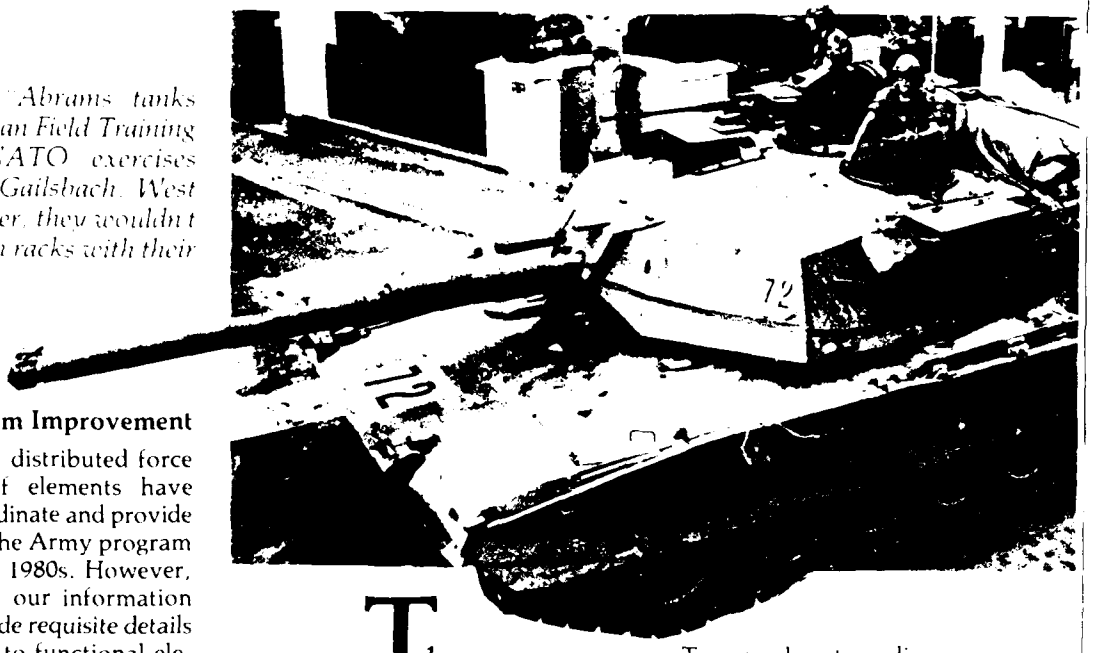
Figure 8. Data/Information Flow—Mission Guidance and Technical Base



Accuracy in Cost Estimates

Accurate costs, especially for facilities, should be developed as early as possible. Although completely accurate life-cycle costs cannot be developed at the earliest phases of the systems acquisition process, it is possible to estimate the basic facility requirements at the concept exploration and validation decision points by extrapolating from the system to be replaced or from similar systems. As a new system's configuration and planned employment become better defined, the facility requirements and cost estimates can be refined and made more accurate.

The Army M-1 "Abrams" tanks make their European Field Training debut during NATO exercises "Reforger 82" in Gailsbach, West Germany. However, they wouldn't fit in existing wash racks with their side skirts raised.



Information System Improvement

Large and widely distributed force modernization staff elements have been formed to coordinate and provide information about the Army program to modernize in the 1980s. However, at the lowest level, our information system fails to provide requisite details in a timely manner to functional elements—engineers, resource management, plans and operations, logistics, and ultimate users.

Management processes that govern the environment for program managers, engineers, resource managers, and users are not fully synchronized; however, forced synchronization would be inefficient and counterproductive. These management processes are too fluid individually, and in relation to each other, to permit efficient synchronization. Opportunities for integrating the PPBS cycle, system development, testing, fielding to units, and the construction process move dynamically with respect to each other.

Detailed management information is not fully developed and provided to decision authorities so that they can execute their responsibilities with full knowledge of program status, schedules, and life-cycle costs. Improvement of management information systems is possible.

Reports required to support the integrated logistic support system, force modernization milestone reporting system, and other aspects of systems acquisition can provide needed information and analysis. The planning, programming, and budgeting system can provide resource management information. The Army modernization information memorandum and the Army force modernization master plan have been initiated and should continue to improve and provide needed information. As these information sources improve and are integrated, there is a potential for reducing decision makers' uncertainties with consequent improvements in efficiency.

The systems acquisition process, which is event-driven, and the construction management process, which is time-driven, have significant potential mismatches...

Conclusions

Answers to questions of attainability and worth of effort are not clear-cut, and actions are appropriate only in certain areas. The Army system to modernize; to include new weapons, equipment, and organizatinal restructuring; and to meet associated facility requirements for that modernization program is generally in place to anticipate, fund, and construct the new facilities needed when fielding is initiated. However, facility requirements, in general, have not been anticipated and adequately thought out during development of new systems.

Too much extraordinary management effort has been necessary to guarantee facilities availability. Certain management control mechanisms either are not receiving enough emphasis, or are not sufficiently developed to guarantee effective facility requirements development. The systems acquisition process, which is event-driven, and the construction management process, which is time-driven, have significant potential mismatches; extensive management efforts are necessary to minimize these mismatches. Furthermore, the program

■ *Colonel Klebe is commander and director, U.S. Army Corps of Engineers Water Resources Support Center, Fort Belvoir.*

■ *Colonel Seibold is director and program manager, Joint Space Program Office, Vandenberg, Va.*

manager has no responsibility for executing facilities construction except in the development of facility requirements. Increased emphasis on the critical nature of this function is necessary to ensure the program manager executes this mission effectively.

Recommendations

In this article, we attempt to demonstrate that systems can be developed and deployed by incorporating facility requirements with a reasonable level of input from program managers and supporting engineers.

Increase efforts to coordinate an integrated management of facility requirements into systems acquisition programs through engineer support to the program manager at the earliest possible phases of system development.

—Provide expanded funding to the program manager for reimbursement to the appropriate engineer activities with mission support designation for resources.

—Increase visibility of facility requirement management efforts for modernization. As a minimum, more time should be spent on this issue at program reviews; e.g., Army Systems Acquisition Review Council.

—Require detailed development and presentation of facility requirements factors during program and resource reviews of system and organizational modernization efforts. The total life-cycle costs with respect to facility requirements should be presented at interim process reviews and, for the first time, not later than the validation phase decision point in the system acquisition cycle. Detailed development of facility requirements, as required by the DOD 5000.39, should be controlled closely.

—Ensure the resources allocated to facility-requirements-related MIS programs (e.g., integrated facilities system, directed stationing system, Army stationing and installation plan, and facility support plans) for earliest availability of data base and technical information to all levels of program review and execution.

—Increase management efforts to incorporate detailed facility requirements factors into management information system elements of systems acquisition, planning, programming and budgeting system, and the total modernization program; e.g., integrated logistic support, logistic support analyses, logistic status review, material fielding plans, Army modernization information memorandum, modernization reference information system, and Army force modernization master plan.

—Ensure development and maintenance of channels to provide detailed technical facilities data to the lowest echelons of engineer support in the major commands.

—Investigate within the command the potential value of redistributing the force modernization manpower spaces at command levels below the major command to functional support elements; e.g., engineers, logistics, and resource management.

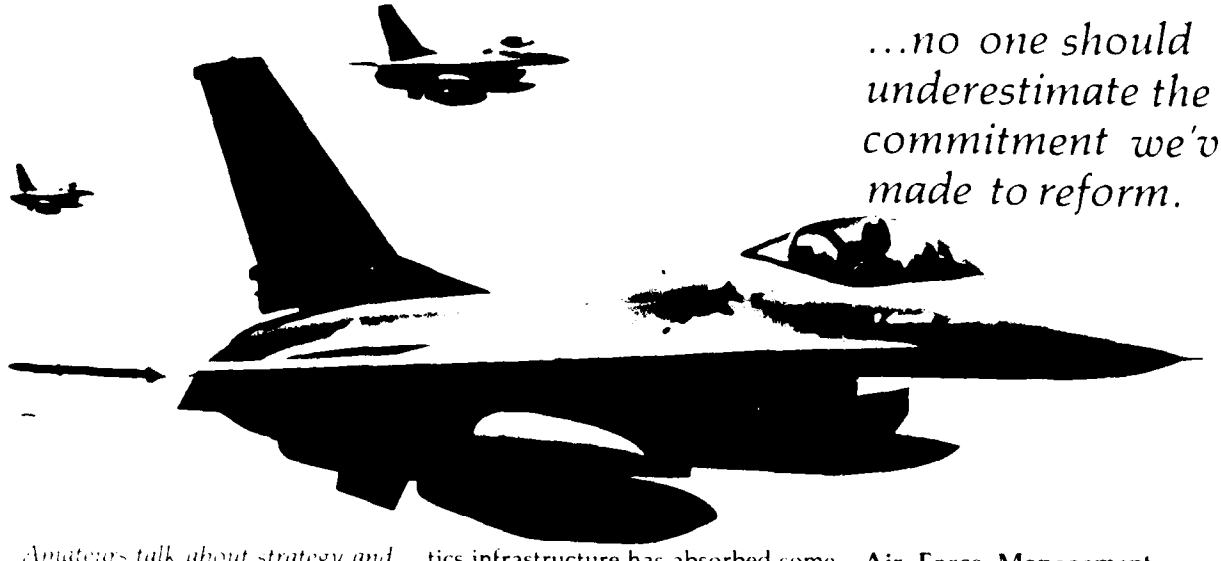
Although this article deals with U.S. Army experiences in systems acquisition and siting, we feel lessons learned, and proposed solutions, should benefit all the uniformed services. An expanded version of this article, in monograph form, is available from the National Defense University, Fort Lesley J. McNair, Washington, D.C. 20319. ■

Planning and constructing Patriot missile unit facilities required huge management activities to meet fielding schedules.

The Patriot replaces the Hawk and Nike Hercules systems with less equipment and operational manpower, and fewer repair parts.

Fair Value for Your Defense Dollar

Lieutenant General Leo Marquez, USAF



...no one should underestimate the commitment we've made to reform.

Amateurs talk about strategy and tactics. Professionals talk about logistics.

Anonymous

Just what is logistics? The textbook answer—requirements determination, acquisition, pricing, contracting, warehousing, transportation, maintenance training, and disposal—clouds the meaning. The essence of logistics is simple: It is working to ensure the availability of weapon systems. Without logistics, nothing functions. That's why I reject the notion of the logistics "tail." Instead, I use the metaphor of the logistics "jawbone" holding the operational "teeth."

Our logistics system is second to none. We support 134 active installations, 139 Air National Guard units, and hundreds of radar sites, missile locations, electronic operations, and other auxiliary airfields. Not only is it large, it is complex. We manage some 850,000 types of items, but that's only 40 percent of the more than two million parts we use. In 1983, we conducted some 4.5 million procurement transactions.

Most importantly, we're doing our job. During the last 4 years, our logistics infrastructure has absorbed some 1,100 new fighters and still improved support markedly: for example, 62 percent more tactical combat sorties in Europe can be flown; strategic airlift capability has increased 66 percent; the time each aircraft is not flyable awaiting parts has been reduced 8 percent.

Yet, lately, logistics has taken on a different hue. Reports of what we've paid for spare parts—plastic caps, bolts, arm rests, coffee pots—followed by revelations of premature parts disposal have called into question our ability to manage our business.

Let me state up-front that we know we have problems. We've paid excessive prices, bought items in uneconomical quantities, and disposed of some too early. We haven't tried to conceal these problems.

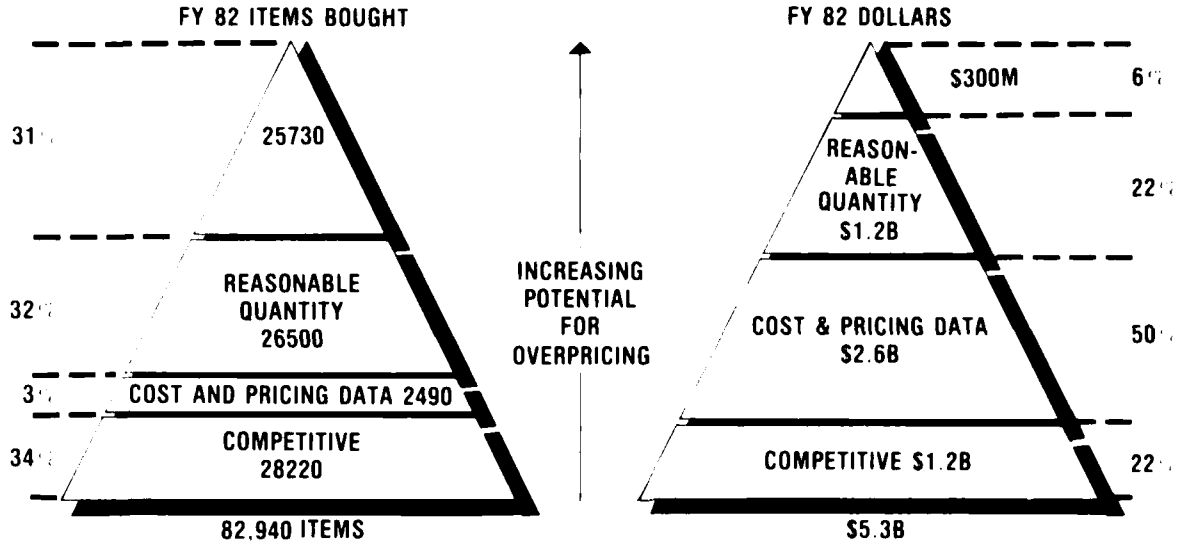
The good news is that behind the glare of television lights and sensationalized headlines, thousands of Air Force employees are working on systematic, comprehensive, and fundamental changes in the way we do business. While it is obvious we won't be able to change this huge system overnight, no one should underestimate the commitment we've made to reform.

Air Force Management Analysis Group (AFMAG)

The Air Force began to investigate sharp price increases in certain spares between 1980-82. These examinations became public in 1982 when a report on engine, spart-parts price increases was released. The result was a series of congressional hearings that convinced Secretary of the Air Force, Verne Orr, and Air Force Chief of Staff, General Charles A. Gabriel, that we needed to look at the entire spares acquisition process. Headed by Major General Dewey Lowe, 60 people spent 100 days studying the process in the weapon system design, development and production phases as well as post-production support activities. There was extensive interaction with industry. The resultant AFMAG study contained 178 separate recommendations. The deficiencies these recommendations address are (1) insufficient competition, (2) inadequate pricing comparison negotiation mechanisms, (3) repetitive buys, (4) incomplete or restrictive engineering data, and (5) cost-accounting methodology.

The implementation apparatus developed for these recommendations

Chart 1. Overpricing Vulnerability (Replenishment Spare Parts)



demonstrates how serious we are. We have a group, headed by a brigadier general, that meets weekly to direct and coordinate actions. Representatives from throughout the Pentagon as well as our two primary buying commands, AFLC and AFSC, attend. The approval level is a General Officer Steering Committee that meets monthly. Only the committee may approve recommendation close-outs, stressing institutionalization of the fixes. We seek permanent changes that will stand the test of time.

How Big Is the Problem?

Before we look at these reforms, it's important to place the overpricing issue in context. Chart 1 addresses our vulnerability to overpricing in terms of replenishment spare parts. The point is that it's not a turkey shoot for unethical contractors or incompetent government employees!

We assume that where true competition exists, the likelihood of excessive prices is low. In FY 82, competition accounted for 22 percent of our replenishment spares dollars and 34 percent of the items. Although that left the majority of our dollars and items outside competitive marketplace forces, two other factors buffer us from overpricing. First, public law and acquisition regulations have given us the tools of negotiation and cost and pricing data. These are powerful substitutes for competition that accounted for nearly 50 percent of our FY 82 dollars, while only 3 percent of the items. The second factor is economical quantity buys. Buying in the proper quantities also lessens the potential for paying excessively high prices. In FY 82, 22 percent of the dollars and 32 percent of the parts were purchased in reasonable quantities.

This gets us to the danger zone: small quantities of low-value items purchased non-competitively. For FY 82, this accounted for only 6 percent of the dollars but a relatively high 31 percent of the items. We've focused our attention here.

Reform Impact Areas

To encourage competition in our acquisition strategies, we've established Competition Advocate (CR) offices at over 160 locations. While only single individuals are at our smaller buying locations, we've added approximately 100 spaces to each of our CR shops at our five major buying centers. These organizations review non-competitive requirements from three vantage points. From a technical standpoint, CR screens the item's acquisition method code. It may find that an item should be competed, "broken out" to direct buy from the actual manufacturer (when the prime contractor adds little or no value to the acquisition), or it may determine the item is clearly sole source. We've looked at over 60,000 items this year and coded over 12,000 competitive for the first time.

The second element of the CR review is an examination of engineering packages. Part of this scrub is to ensure adequacy and quality. But of greater long term consequence is the CR challenge of proprietary data rights claims. The Air Force simply must have adequate tech data for competitive and breakout acquisitions, and the institutionalization of these data challenges portends increased competition and the development of a wider industrial base as more firms gain access to defense procurements.

The third review conducted by our CRs takes us to our second generic reform area: pricing. Pricing procedures had evolved to cope with an increased workload without a corresponding increase in manpower resources. Accordingly, we had adopted the classic management principle of concentrating on our larger dollar buys where the return might be greater. But as AFMAG demonstrated, our overpricing area of vulnerability was low-volume, low-cost buys.

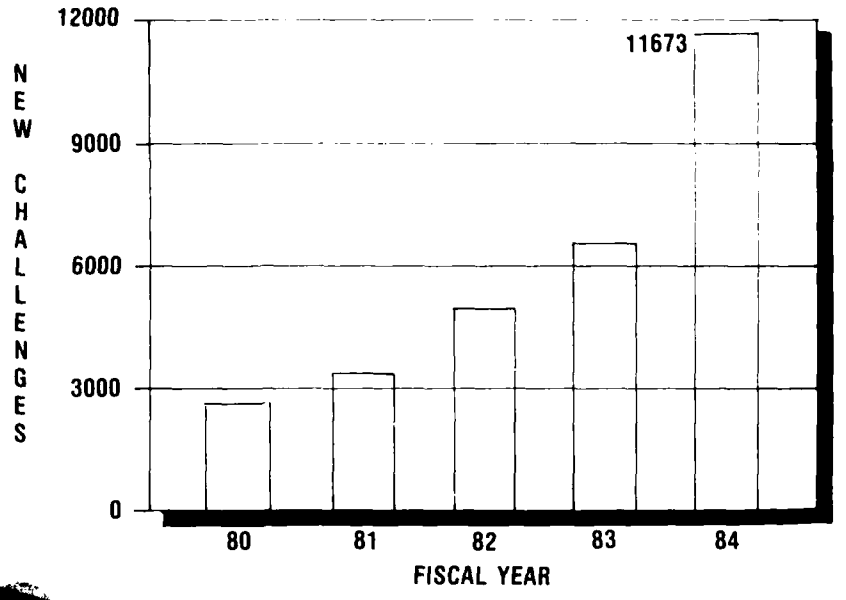
Accordingly, we've adopted two new pricing techniques. Spares Management Analysis and Review Technique (SMART) pricing addresses purchases under the thresholds requiring certified cost and pricing data. It occurs within the CR organization and has two levels. Level One is a subjective review by our pricing analysts based on the item's previous history and a visual inspection of the item or its drawings. Basically, it's a "does this price make me mad?" test. Those items failing Level One undergo a more de-

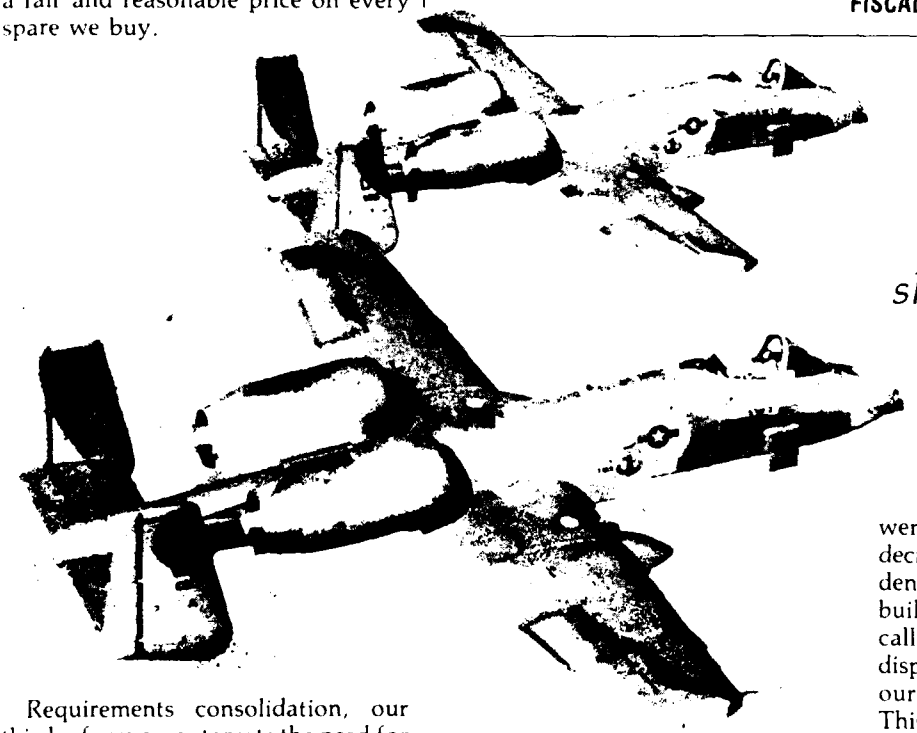
tailed examination involving an engineering analysis and estimates of material, labor, and packaging costs. If the target price developed is still unacceptable to the contractor, the item is referred to a "resolution cell," which looks for other ways of acquiring the item; e.g., reverse engineer, manufacture in-house, etc.

Price Analysis and Review Techniques for Spares (PARTS) addresses larger purchases and assures every line item on an applicable contract is reviewed and analyzed. High-value items are priced using cost and price analysis supported by DOD auditors. Low-dollar items receive a subjective screen and, if questionable, are subjected to the same cost and price analysis as high-dollar parts.

SMART and PARTS pricing began in April 1984, and their synergistic effects should take us a long way toward a fair and reasonable price on every spare we buy.

Chart 2. Zero Overpricing Challenges





The point is that it's not a turkey shoot for unethical contractors or incompetent employees.

Requirements consolidation, our third reform area, targets the need for more economical quantity buys. Historically, inadequate funding of our programs has forced us to buy smaller quantities more frequently. With increased funding for readiness and sustainability, we've been able to consolidate our buys and expand buy periods to 1 year on stable demand items. This allows us to reduce cost to order while concurrently taking advantage of price breaks accorded larger quantity purchases.

Ironically, it was a recognition of our movement toward larger quantity buys that caused us to investigate our spares retention and disposal practices. Disposal is the means by which we control items that exceed our immediate needs; we wanted to be sure we were retaining these parts even if they were excess to our current needs.

What we discovered was that complicated and systemic ADP problems were frustrating intelligent retention decisions. To ease the workload burdens on our item managers, we had built an ADP network that automatically sent items considered excess to disposal. Only active intervention by our managers could stop the process. This was unsatisfactory. So, in addition to a freeze I instituted on all disposals of serviceable or reparable items, we are reorienting our management philosophy and changing computer logic to require the IMs to initiate a disposal. If the manager does nothing, the item remains. While this will require difficult software changes,

■ *Lieutenant General Marquez is the deputy chief of staff, logistics and engineering, Department of the Air Force.*

we are firmly committed to ensure not a single dollar is wasted due to incorrect disposals.

Zero Overpricing Program (ZOP)

All the reforms I have discussed thus far have been procedural. But without basic attitudinal changes among our workforce, these reforms will be sterile and ineffective. That's why we're ing hard to develop a new cost consciousness among our employees. And while the CR shops represent our institutional commitment to fair and reasonable prices, our Zero Overpricing Program is really the leading edge of our effort to create a new mindset among our people.

The ZOP was instituted in March 1979 to encourage and reward personnel who identify and report items suspected of being unreasonably priced. It represents our grassroots' network to fight overpricing; it recognizes that, in this day of data automation, looking at and touching a spare part by someone who uses it might identify price disconnects the computer doesn't.

The program has exploded in recent years (Chart 2). From 2,700 challenges in FY 80 to 6,300 in FY 83 to almost 12,000 this year, it's clear the message of individual responsibility for fair and reasonable prices is being understood. And while statistics show only 8 percent of these challenges to be correct, we've realized $2.4 million savings from them in the past 24 months. A strong incentive program re-enforces this behavior. In addition to $110,000 in cash awards, we've given out over 3,500 letters of appreciation/commendation and over 100 other awards (3-day passes, etc.) during the same period.

For every 'horror story' that makes your newspapers there are plenty of successes...

Cradle-to-Grave Reforms

I've only touched on a tiny portion of the over 400 individual initiatives in work that impact our entire spares process. They represent cradle-to-grave changes in our business of logistics support.

And while we've only just begun, already we're seeing paybacks. For every "horror story" that makes your newspaper, there are plenty of successes that substantiate the correctness of our new procedures. For example:

—A reprocurement package for struts on the F-4 landing gear is acquired which allows a competitive buy that dropped the unit price from $48,827 to $36,780.

—A break-out of electronic arrestors resulted in $57,000 savings plus a 54-week improvement in leadtime.

—A first-time competitive buy of 9,000 engine components saved $7.2 million.

While our goal is fair value for every defense dollar spent, it's really more than that. Ensuring fair and reasonable prices is a worthwhile goal. But to waste precious and scarce defense dollars is to risk undercutting the public confidence in our stewardship of their security. That is the ultimate sin we are determined we shall never again commit.■

F-16 Delivery a Multination Feat

An F-16 aircraft delivery ceremony at an assembly plant near Brussels, Belgium, earlier this year was a milestone for the largest international coproduction effort in the history of military weapons programs. On display at the SABCA Gosselies plant was the 998th F-16 aircraft built as part of a 10-year, five-nation pact between Belgium, Denmark, Norway, the Netherlands and the United States. While the event signified the completion of the original agreement to build 998 fighters, it also heralded a new phase of the agreement for joint defense coproduction. The program has resulted in additional off-shore buys of more than 700 additional planes through separate European and other-country buys. The original joint venture is now transitioning into the follow-on buy, third-country buy and logistical support phase for the operational life of the planes. The F-16 Multinational Fighter Program started a decade ago with the agreement among the five North Atlantic Treaty Organization partners. The F-16s have been assembled from components produced in each of the countries. European air forces initially purchased 348 aircraft and the U.S. Air Force procured 650. The planes were delivered on schedule and within projected cost.■

AWACS Units Shuffle Roles

With the reactivation of 28th Air Division at Tinker AFB, Okla., the 552nd Airborne Warning and Control Division has been redesignated the 552nd AWC Wing. The reorganization is intended to ease management strains created by the organizations' unique worldwide commitments. The units are the primary operators and maintainers of the Air Force fleet of 33 E-3 AWACs aircraft. The 552nd also trains E-3 crew members and operates and maintains EC-135 aircraft at Tinker.■

Wastebuster Seeks to Eliminate Waste

The Air Force, traditionally haunted by a highly complex supply system that has driven people to trash usable government property, is working to rid the system of ghosts by simplifying and saving through a program called Wastebuster. Headed by Air Force logistics and engineering officials, the campaign has simplified turn-in procedures and given units more control of their supplies. Although the program is in its infancy, changes are in place at almost all base supply and maintenance operations and some bases report significant responses. In some instances, hundreds of thousands of dollars worth of usable supplies have been turned in that might otherwise have been tossed out.■

A DOD CHALLENGE

The Consistent Challenge: Spare Parts

Lieutenant General Donald M. Babers, USA

The pricing of spare parts has been a consistent challenge for the Department of Defense. Recent media allegations about overpricing certain items have heightened DOD interest to assure that spare parts are bought at reasonable prices. One of the principal means to combat overpricing is by promoting competition to avoid sole-source purchases. The Defense Logistics Agency, which buys approximately 60 percent of items in the *Federal Supply Catalog*, is committed to that objective.

The DLA intensified efforts in several areas after Defense Secretary Caspar Weinberger issued, in mid-'83, two policy statements on spare-parts pricing. The 25 initiatives he set forth concern spare-parts acquisition from initial-item concept through purchase. To ensure the Secretary's initiatives were effectively implemented, DLA sought, and was given, more personnel to utilize in areas most needed to promote competition and to avoid unreasonable prices. Value-engineering staffs in the four DLA spare-parts buying centers were increased by 40, doubling the number assigned to this program. Personnel dedicated to breakout from sole sources in acquiring replenishment parts were tripled by adding 50 people in the supply centers. Thirty positions have been added to the military parts control groups in the supply centers.

We have requested an additional 385 positions for DLA contract administration activities to provide additional production and pricing specialists, pricing analysts, engineers, and contract management personnel. A special group of training courses, including basic acquisition and pricing, is being given to DCAS people, including many of our new hires. The DCAS provides contract administration support for all of the Department of Defense, NASA, and some civil agencies.

In addition, we have established Competition And Pricing Offices (CAPOs) under the competition advocates appointed in 1982 in the DLA spare-parts buying centers. These CAPOs are the focal points for identification, referral, coordination, and reporting of competition and pricing projects within the centers.

DLA resources are being strengthened in these areas because these programs and efforts are successful in increasing competition and saving spart-parts costs.

Value Engineering

Value engineering, which involves reviewing drawings and specifications to avoid unnecessary item costs, has proved an effective means of promoting competition. At DLA, value engineering is not limited to cost savings; much of our value-engineering effort is devoted to developing adequate technical data packages through reverse engineering, assisting industry in reverse engineering, and otherwise locating potential sources of supply.

	FY 1982	FY 1983	FY 1984
Savings from Value Engineering	$42 million	$51.6 million	$75 million

Acquiring technical data—the engineering drawings and specifications a contractor needs to bid on a part—have always been a major problem. When an adequate technical data package is provided, new contractors can be induced to bid against a supplier who may have been the sole source for the item.

Here are some samples of how procurement can be affected by technical data.

—A manufacturer charged $1,860 each for replacement labyrinth rings for a submarine pump. No technical data were available for the rings. The item was examined by value engineering personnel, technical data were developed, and subsequent competition reduced the price to less than $50.

—Another reverse engineering effort resulted in development of technical data for a machine key used in the power train of a helicopter. Subsequent competition reduced the price of $33.58 each to 72 cents each.

The DLA value engineering program has paid off handsomely. As DLA increased its emphasis on value engineering and additional manpower has been assigned, we have seen cost savings mount appreciably:

Technical Data

To address the technical data problem, DLA instituted a technical data management study. One significant payoff from this study is the Original Equipment Manufacturers (OEM) Data Program, whereby sole-source items lacking adequate technical data are identified and stratified by dollar value. The lists are presented to OEM top-level management by DLA field activity commanders. The OEMs are requested to furnish technical data, release proprietary rights to technical data, and or identify manufacturers of subcontracted, no-value-added items. The payoff from approaching 20 companies with lists totaling over 65,000 items has been the furnishing of actual manufacturing source data for over 11,000 items, with the remainder still being screened.

Not only does the lack of adequate technical data create difficulties in competition; also, management of the several million technical documents we do have is a major problem. In this area we are upgrading our technical data repositories. Two of our hardware centers are already automated, and upgrading is in process. The other two are to be automated in May 1985 with full automation and upgrading complete by the spring of 1986. This

will enable us to be more responsive to industry and to meet intra-agency needs.

Breakout

Under the Replenishment Parts Breakout Program, sole-source items are subjected to a 65-step review before any need to buy. The DLA has a goal to break out 20 percent of the items reviewed from sole-source status. Savings are projected at 25 percent of annual purchase value, approximately $13 million for FY 1985. We have exceeded our 20 percent goal in FY 1984 by increasing competition on 2,200 items out of 8,900 reviewed.

Parts Control

Actually, DLA works to reduce spare-parts prices while weapon systems are still on the drawing boards. The four DLA hardware centers have Military Parts Control Advisory Groups responsible for screening new items and promoting the use of preferred or standard parts during the design phase of weapons systems or equipment. Secretary Weinberger's initiatives have made this program mandatory and 30 additional positions have been added to handle the increased workload.

Here are the cost-avoidance benefits derived from the Parts Control Program and the growth in its application since 1982.

	FY 1982	FY 1983	FY 1984
Contracts Supported	544	557	633
Non-Standard Parts Reviewed	40,403	45,106	50,915
Non-Standard Parts Replaced	10,423	10,753	14,075
Life-Cycle Cost Avoidance	$115.5(MIL)	$129(MIL)	$140.9(MIL)

Overpricing-reviews have shown significant payoff. Through increased automation in identifying possible overpricing cases, voluntary refunds have been received from over 300 contractors on 583 substantiated cases amounting to $683,471.

Managers are being encouraged to make incentive awards to DLA personnel who demonstrate exceptional performance in competition and pricing and to take disciplinary action against those who fail to take appropriate action when overpricing may be involved. Nearly 200 cash awards have been presented to DLA personnel for significant cost-savings efforts.

Pricing Analysis

In addition to these efforts, focused for the most part on DLA procurement centers, programs to lower spare-parts prices have been strengthened in the agency's Defense Contract Administration Services (DCAS). This is the DLA organization that monitors most defense department contracts, including contracts for major systems.

The DCAS has been the proponent of many spare-parts pricing initiatives. Some spare parts have been overpriced because support costs were distributed equally to each line-item irrespective of actual worth. The DCAS found that equal allocation of support costs distorts prices and usually results in prices out of proportion to actual worth. Subsequently, DLA established policy directing that spare-parts support costs be allocated on a percentage of cost basis.

That policy, later promulgated throughout DOD, initiated our program to end a practice that contributed to some of the early spare parts "horror stories" by artificially inflating prices of low-cost spares. To understand the old system, imagine an order for spare parts listing only two line-items: one, a generator with direct costs totaling $100,000 and the other, 10 switches at $25 total. If $10,000 in support costs were allocated equally among the two line-items, the switches final unit price would be $502.50 each!

In addition to our program to end this misleading allocation of certain support costs, DLA has directed DCAS experts to ensure that contractor pricing methods preserve unit-price integrity and follow *Armed Services Pricing Manual* guidance. A review policy has been developed to analyze high-dollar items in depth, and lower cost items by random sampling.

In August 1984, we issued specific spare-parts pricing guidance requiring that, for proposals with a small number of line items (1-15), all items will be subject to an in-depth review. For spare-parts proposals with more than 15 items, high-dollar items will be earmarked for in-depth review. A random sample of low-dollar items will be selected for an in-depth review, and the remaining low-dollar items will be visually reviewed to detect potential anomalies. In addition to cost and price analysis, in-depth analysis includes a value review to assess the intrinsic worth of an item.

The DLA has aggressively implemented the requirements of Defense Department policy for follow-up on contract audit reports. Increased emphasis has been placed on resolving and disposing of contract audit recommendations. An initiative to automate the tracking and reporting of contract audits has been implemented to eliminate manual record keeping, increase accuracy of reports, and provide on-line inquiry capability. We are devoting significant management attention to resolution and disposition of contract audit recommendations.

The agency recently acquired 132 microcomputer systems to evaluate proposed and incurred contractor costs. These systems, with purchased and in-house developed software, are used to: (1) compare proposed spare-parts prices with prices previously negotiated with contractors; (2) track and compare incurred overhead costs with proposed overhead costs to develop variances that might point up inefficient contractor operations; (3) compare individual contractor compensation costs with industry going rates to determine reasonableness; and (4) analyze the accuracy of proposed labor hours based on past experience. Using the microcomputers for these functions and for preparing pricing reports will provide additional time for price cost analysts to perform more in-depth analysis of contractors' proposals. This provides additional assurances that the government pays fair and reasonable prices for weapon systems and related spare parts.

All of this activity ultimately translates into lower, instant spare-parts prices, plus more reasonable spares prices in the future.■

■ *Lieutenant General Babers is the director of the Defense Logistics Agency.*

INSIDE DSMC

People on the Move

LTC Richard T. Banks, USA, a professor in the Policy and Organization Management Department, is a graduate of PMC 82-2. His last assignment was Department of the Army coordinator at ODCSRDA. Lieutenant Colonel Banks holds a B.S. degree in business from Cameron University, and an M.B.A. degree from Marymount College.

Mrs. Helen Haltzel is a catalog librarian in the Information Directorate. She has been a librarian for the Fairfax County Public Schools, Longwood College, and the State University of New York at Albany, where she received an M.L.S. degree. Mrs. Haltzel also holds an A.B. degree in economics from the University of Michigan, and an A.M. degree in Soviet studies from Harvard University.

Losses

Amy Boyd, student aide.

Patricia A. Kelley, Research Directorate, to the Office of the Army Advocate, Pentagon, and promoted to GS-15.

Commander Benjamin R. Sellers, USN, Business Management Department, to F-4 Program Office, Crystal City, to be deputy program manager for financial planning and control.

Barbara Shelton, School of Systems Acquisition Education, to U.S. Army Corps of Engineers.

David Sherrard, Audiovisual Division, retired.

Additions

Seaman Margaret Ealey, USN, to Administrative and Personnel Services.

Darlene Miller to Publications Directorate.

Master Sergeant Orville Wright, USA, to Audiovisual Division.

Promotions

Iran L. Barnes, USA, Supply and Procurement Division, to E-6.

Terry Bouslough to Department of Research and Information, to be secretary to the dean.

Thurman Makes Third Star

DSMC's fifth commandant, Air Force Major General William E. Thurman, has been promoted to the grade of lieutenant general and assigned as vice commander, Air Force Systems Command.

General Thurman, who was the Defense Systems Management College Commandant from 31 July 1979 to 8 January 1982, has been serving as Deputy for B-1B Aeronautical Systems Command. He was born May 17, 1931, in Hogenville, Ky., and is a command pilot with more than 3,400 flying hours, including 56 combat missions in Southeast Asia. ■

Alternate Sources For Backup Power

Engineers at the Troop Support Command Research and Development Center, Fort Belvoir, Va., are studying alternate power sources. These are to provide backup power for the mobile electric generators used with shelters mounted on the Army's new commercial utility cargo vehicle (CUCV) and high-mobility multipurpose wheeled vehicle (HMMWV). These shelters are typically powered by trailer-mounted generators towed to the operating site. Current doctrine calls for each shelter to be equipped with a power unit consisting of two generator sets mounted on a single trailer—one as the primary power source and a second as a backup unit when the primary generator is being repaired or undergoing maintenance. This is expensive, presents more logistical problems, and hampers mobility.

The Tactical Energy Systems Laboratory is studying two techniques to enable soldiers to use a vehicle engine as a backup power source in place of the backup generator set. Prototype kits are being fabricated to use a belt-driven rotating AC alternator mounted in the vehicle's engine compartment. Two kits will be installed by the Army Development and Employment Agency (ADEA) and provided for concept testing to the 9th Infantry Division at Fort Lewis, Wash. Further testing will be at Fort Hood, Texas, and Harry Diamond Laboratories, Adelphi, Md. Another approach, using a solid state inverter power from the vehicle's electrical system, is being installed by ADEA and evaluated by the 9th Infantry Division. ■

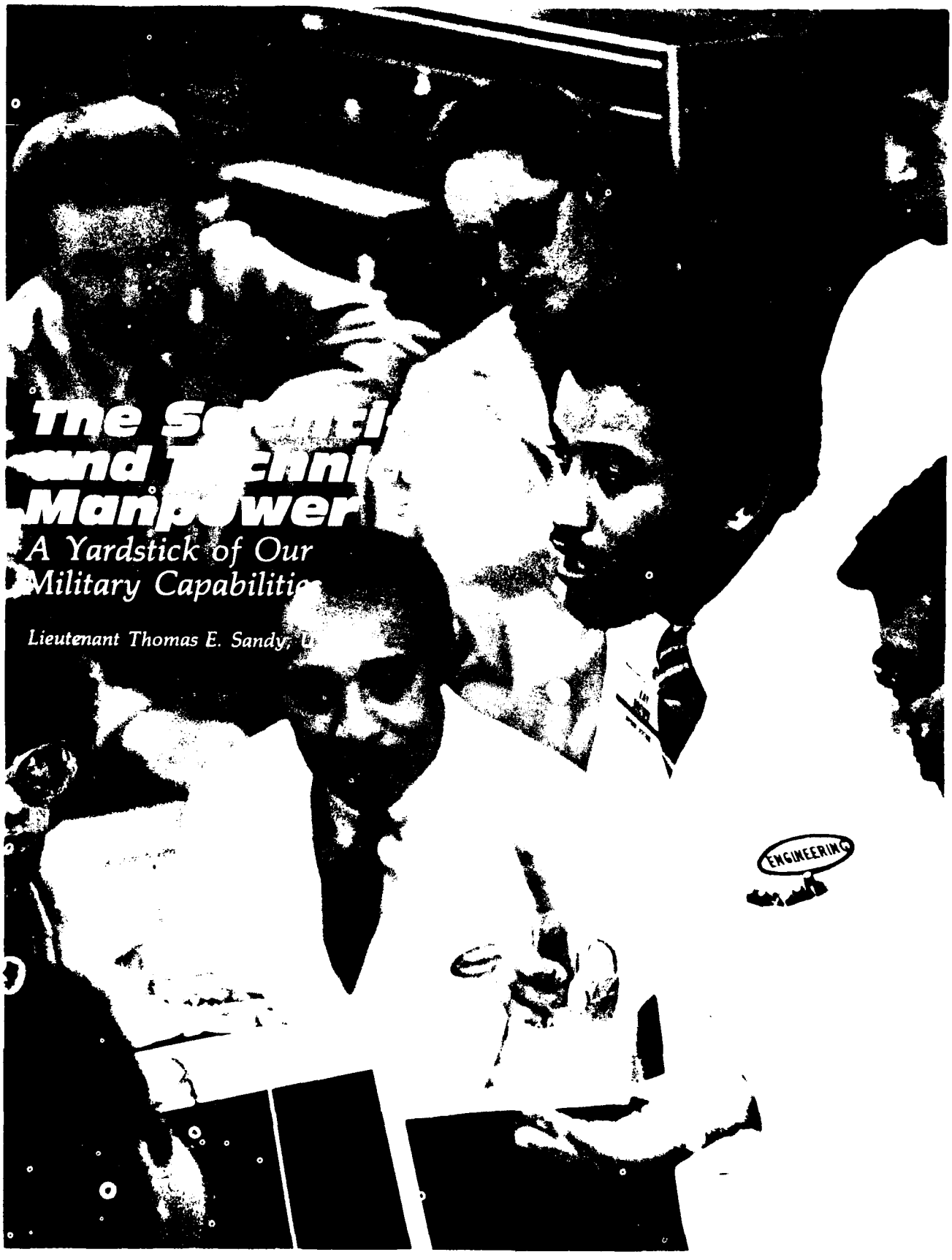
C-5B Rollout Set for July

The Air Force's first C-5B Galaxy transport is to debut at the Lockheed-Georgia Co. plant at Marietta, Ga., July 12. The event will mark completion of the first of 50 of the huge cargo aircraft. The first plane is to be delivered to the Military Airlift Command in December. MAC currently flies 77 C-5As from Altus AFB, Okla.; Dover AFB, Del.; and Travis AFB, Calif. In addition, Air Force Reserve wings at Kelly AFB, Texas; Westover AFB, Mass.; and an Air National Guard group at Newburgh, N.Y., are to operate the aircraft. The C-5B is an updated version of the "A" model, and features an improved wing, new engines, tougher aluminum alloys and modern avionics. ■

Diesel Engine Generator

Sixty 750kw diesel engine generator sets have been procured by the Troop Support Command's Belvoir R&D Center.

This generator is a self-contained, air transportable unit providing medium voltage (2400 4160V) electric power for military facilities throughout the world. Sets will be used by the Facilities Engineering Support Agency (FESA) and the Naval Energy and Environmental Support Activity (NEESA) to supply primary and standby electric power for critical facilities like computer centers, communications installations, and satellite tracking stations. The Navy will use the sets to supply electric power for the Fleet Hospital, which is being developed as part of the Rapid Deployment Force. ■



The S[illegible] and T[illegible] Manpower

A Yardstick of Our Military Capabiliti[illegible]

Lieutenant Thomas E. Sandy, U[illegible]

The scientific and technical (S&T) manpower base is a vital link in a country's economic development. It either restricts or increases a nation's influence in the international arena. It serves as a yardstick for the measurement of current and future military capabilities. Since the 1950s, the Soviet Union has realized this and has invested heavily in the improvement of its S&T cadre, which is currently three times the size of the U.S. scientific and technical work force.

Production of Engineers

Although the United States produces 1.5 times as many college graduates as the Soviet Union (Figure 1), this ratio changes drastically when comparing graduations of engineers. The Soviets out-produce the United States at a 5:1 ratio (Figure 2). (The Soviet undergraduate of "first" degree is comparable to the U.S. master's degree, and, therefore, master's degree graduates are included in the U.S. total). Additionally, the inability of U.S. academic institutions to attract and retain advanced degree holders creates a near-term, as well as long-term, continuation of significant Soviet superiority in numbers of engineers produced.

The purpose of engineering education in the Soviet Union differs greatly from that of the United States. Here, engineers are prepared to fit into the industrial environment; the Soviet engineer is educated to fill a specific position within a narrow field of industry.

The Soviet economy has a high priority toward defense, and the annual graduations of engineers capable of performing defense research, development, and production reflect this orientation. Approximately 60 percent of all engineering graduates are trained in defense-related specialties (Figure 3), which are basically in five areas (Figure 4). This does not mean

Honeywell's Defense Systems Division formed an affirmative-action task force to recommend new ways to attract and retain professional employees, including scholarships for minority students.

Figure 1. Annual College Graduates U.S./U.S.S.R.

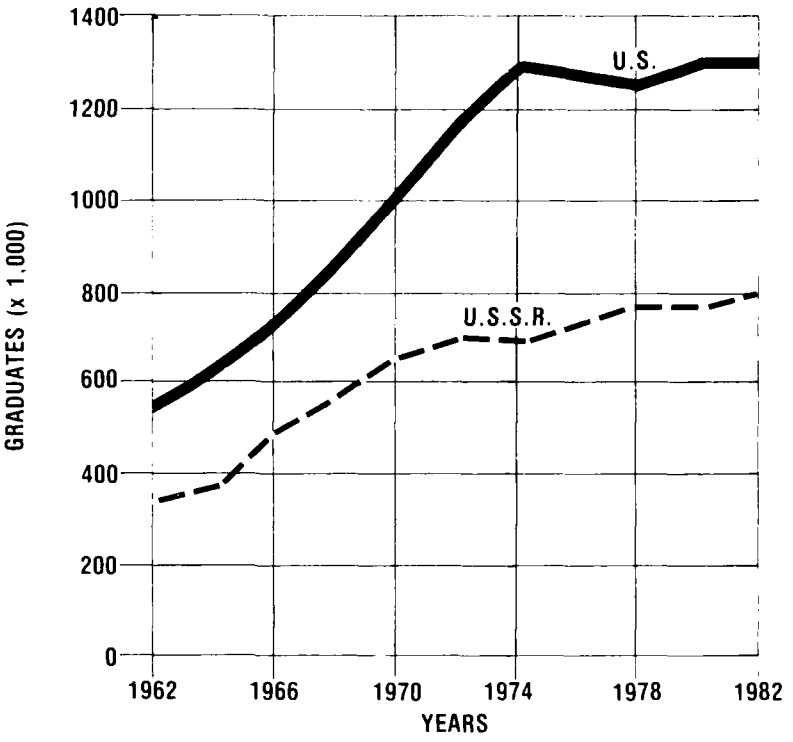


Figure 2. Annual Engineering Graduates U.S./U.S.S.R.

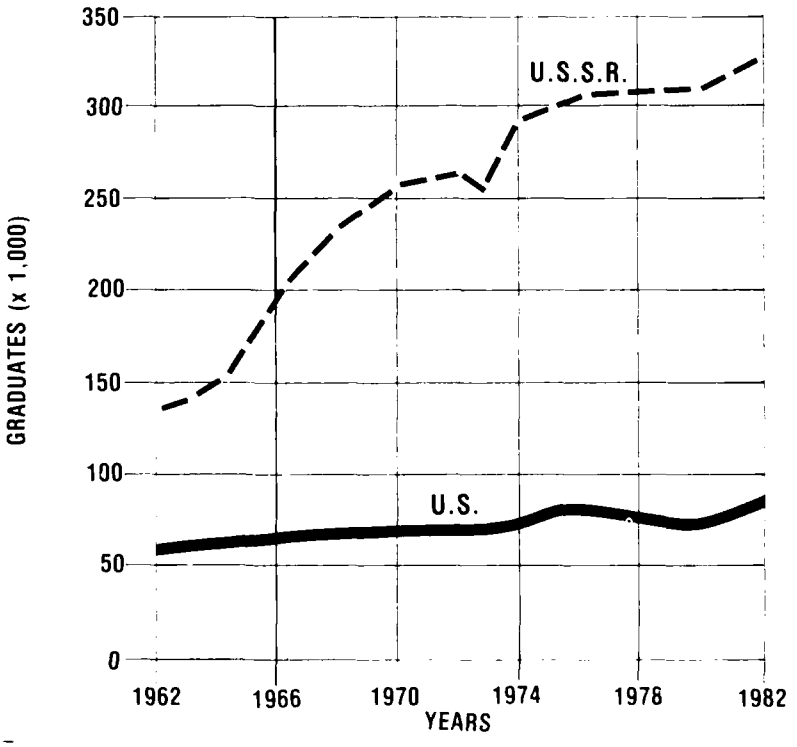


Figure 3. Specialization of Soviet Engineering Graduates

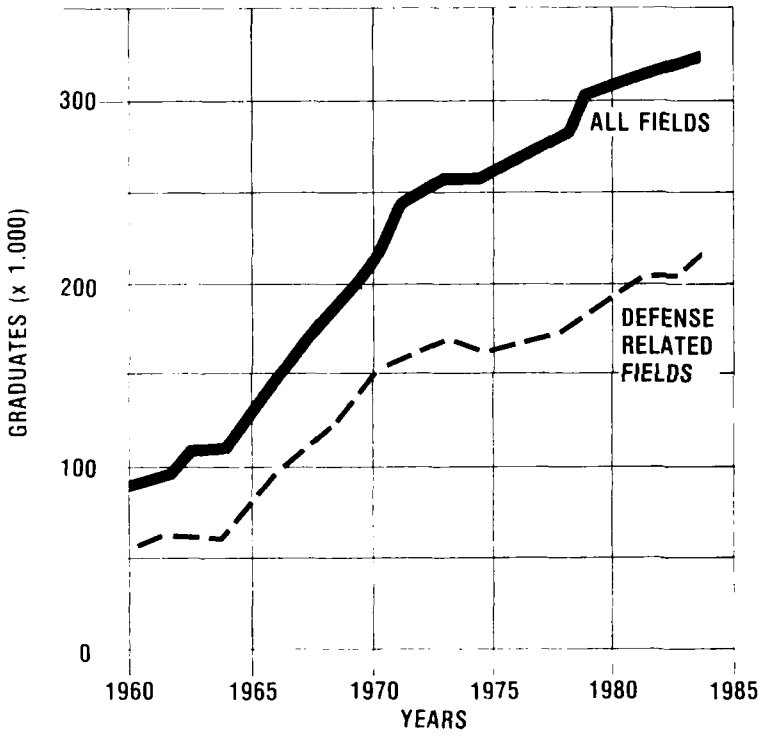


Figure 4. Soviet Engineering Specialties

DIRECT DEFENSE POTENTIAL	INDIRECT DEFENSE POTENTIAL
1. POWER ENGINEERING	1. GEOLOGY AND PROSPECTING
2. METALLURGY	2. MINING
3. MACHINE AND INSTRUMENT BUILDING	3. FORESTRY ENGINEERING, PLYWOOD, CELLULOSE, AND PULP ENGINEERING
4. ELECTRONICS, ELECTRICAL INSTRUMENT BUILDING AND AUTOMATION	4. FOOD INDUSTRY ENGINEERING
5. RADIO ENGINEERING AND COMMUNICATIONS	5. CONSTRUCTIVE ENGINEERING
6. CHEMICAL ENGINEERING	6. GEOLOGY AND CARTOGRAPHY
	7. HYDROLOGY AND METEROLOGY
	8. AGRICULTURE ENGINEERING
	9. TRANSPORTATION
	10. CONSUMER GOODS ENGINEERING

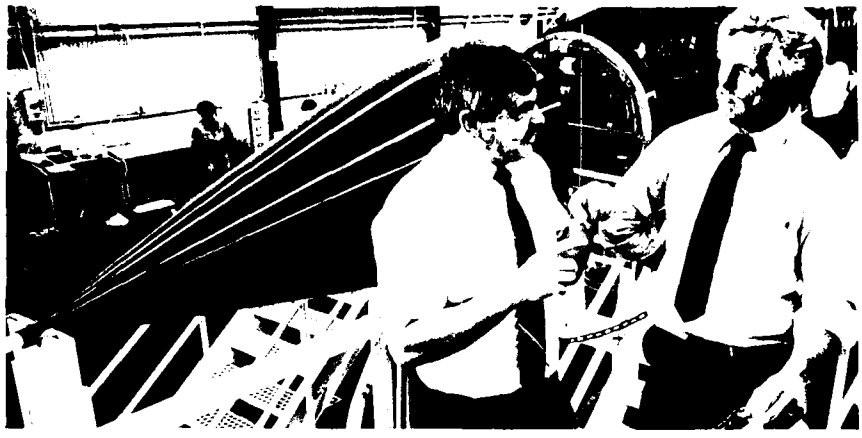
that engineers in these areas are assigned or employed in defense industries, but that this over-production of defense-capable engineers (seemingly a national policy) enhances the Soviet surge capability.

The element within the scientific and technical sector capable of accelerated research and development and quantum jumps is the Ph.D.-caliber personnel. The Soviet *Kandidat* and *Doktor* degree holders are the leading edge of research and development. The Soviet Union maintains a quantitative edge of 2:1 in Ph.D.-level engineers (Figure 5). This lead is actually 10-20 percent greater when considering the number of foreign students who receive their Ph.D.s in the United States and return to their native country.

Although the Soviets have a numerical edge in the production of Ph.D.-level engineers, the Soviet Union advanced-degree system was found to be greatly abused in the mid-70s. Authority was reinforced within the system and increased rules and penalties were instituted. This was found to be effective, but only temporarily. The same problems of plagiarism and low-quality work are again the subject of criticism within the advanced degree award system.

Quality of Engineering Education

When looking at professional manpower, it is necessary to examine the educational training to determine the quality of work provided by this work force. There are several factors that affect the quality of Soviet scientific and technical education in a positive manner, others that have a negative influence, and some that are impossible to determine.



One positive factor is the amount of practical work experience the Russians receive at an institute of higher education. They spend summers, and in many cases, the entire final year of education, working in an industry related to their specialty. This is similar to a U.S. co-op program, except that it is mandatory, and, in most cases, they are assigned positions upon graduation to the industry in which they trained.

Soviet scientific and technical higher education has compulsory foreign language courses, especially in Western (English, French, German, Italian, Spanish) and Japanese languages. This allows students to utilize Western technical journals and other high technology documents to update and advance their own technology.

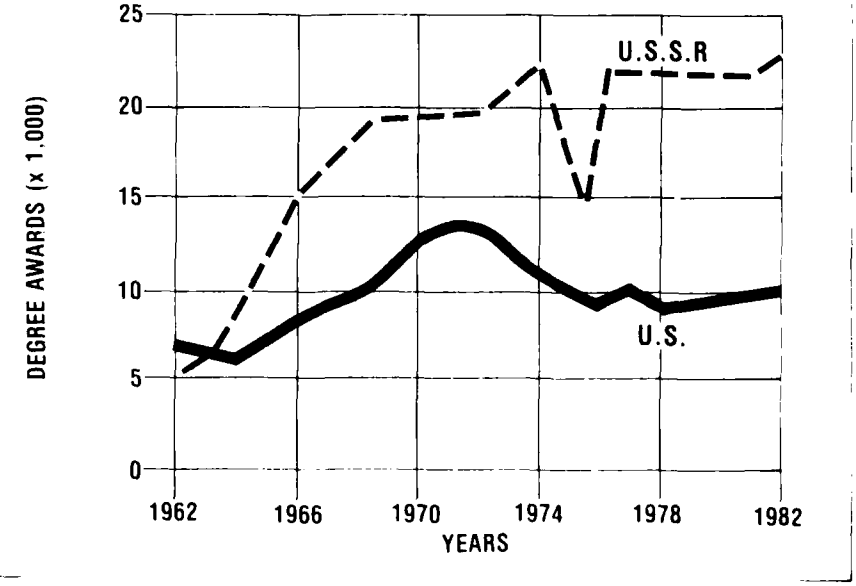
Unlike the United States, Soviet educational institutes do not have to compete with industry for personnel. Higher education has the capability to draw faculty directly from industry if needed, allowing them to put current work experience directly into the classroom. This enchances the engineering students' productivity directly upon entering the work force, unlike the U.S. engineer who usually requires on-to-job training to perform a specific function.

As mentioned earlier, the amount of practical experience received by Soviet engineers is a big plus, yet it causes many problems. Because of the vast amount of practical work engineering students are involved in, their overall training is narrowly focused and in-depth. This limits the productivity of the engineer because of his inability to perform functions other than his specific specialty, which, in turn, limits professional growth and mobility. The Soviet Union is attempting to correct this deficiency in training by introducing *broad profile* engineers—specialists who are taught other engineering skills besides their particular specialty, as well as instruction in economics and management.

A second problem facing Soviet education is a lack of qualified applicants for engineering programs. From the 1950s until the late 1970s, engineering schools grew and had more applicants than available spaces. There were as many as 25 applicants for every opening at some institutes, allowing schools to choose the cream of the crop. However, interest in engineering as a profession has dropped within the last few years due to demographic problems, increased interest in social sciences, and other jobs with greater financial incentives. The ratio of applicants to openings has dropped to 4:1, or even less, at some institutes. Some of the most prestigious Soviet engineering schools have difficulties in filling openings in their entering classes. This lack of high-quality applicants is forcing the Soviets to rely more on part-time engineering programs. However, this too is a problem because instructors and curricula for these programs tend to be of low quality, while attrition rates are extremely high. Attrition as high as 50 percent has been noted for some programs, and much of this is due to a lack of upward growth and mobility for graduates.

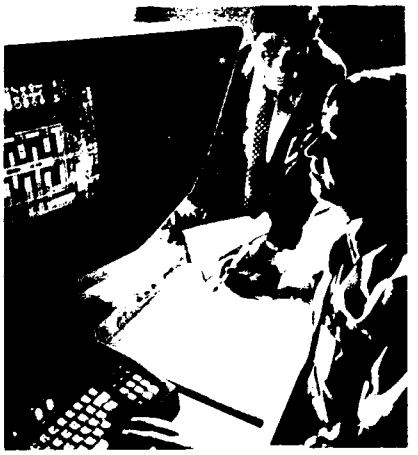
Other factors have a great influence on the quality of engineering education, yet these have variables that make analysis difficult. One is the operation of the Higher Attestation

Figure 5. Doctoral Level Graduates in Natural Science and Engineering U.S./U.S.S.R.



... engineers at United ... Chemical Systems ... advanced propul ...

Whereas Soviet engineer retention is low, employee stock options, excellent health benefits, environmental air grades, and pension plans such as those available to these scientists at Raytheon, not only promote employee recruitment and retention, but guarantee quality people for defense industry.



The Soviet shortage in ADP and advanced computer systems is another area where we lead. Here Rockwell engineers specialized in network analysis and advanced microchip design work on a top secret project in advanced electronics.

Commission VAK, which controls the awarding of advanced degrees. In 1974, a major restructuring of this organization took place in response to an increased number of degrees being awarded, yet the quality of dissertations was poor. Requirements for the acceptance of dissertations were strengthened, causing a severe drop in graduating doctoral-level engineers. At the present, there are several indications that a similar restructuring may take place, causing another drop in numbers of doctoral-level degrees awarded.

A second uncertainty factor is ... It is widely publicized ... the Soviets are experiencing severe ... problems with a declin... rate and increased death rate.

The uncertainty is caused by a ... birth rate in the western ... which produce most of the ... trained technical personnel ... birth rate and the labor ... of the central Asian republics is ... The Soviets must ... method to train the central ... people, who are mainly rural ... and lack technical educa... ... them more ... of the industrialized ... Much of the prob... ... ethnic problems and ... to agree to Rus... ... central Asian ...

A third factor is the state-planning mechanism, which develops the plan for the distribution and placement of engineering graduates. By nature, it is bulky, bureaucratic, and inflexible. The planning for the distribution of graduates may take place 7 years in advance of their graduation, according to the needs (present and future) of the economy. Problems occur when the economy changes within this 7-year period, and the inflexibility of the system will not allow it to adjust to meet the immediate needs of industry. This creates the need for numerous short-term fixes, which may create a domino effect in the future. Whether this band aid approach will continue or whether the Soviets will develop a viable system for the placement of engineers is still uncertain.

R&D Engineering Productivity

The Soviet Union has a large manpower base employed in research and development. Trends in employment provide a sharp contrast when compared to the United States. Figure 1 ... The Soviet ... not experienced ... or downturns in employment in research and development, whereas the United States has marked fluctuations. Market changes are primarily responsible for U.S. fluctuations while the continued growth of Soviet research and development employment is due to planned economy. However, in the 1980s, there is a renewed growth trend in U.S. figures while Soviet growth seems to be leveling off. This and differences in the use and management of research and development scientists and engineers may, in actuality, bring the two figures closer together.

The Soviet Union openly admits to a low productivity level per engineer. A large percentage of this is due to poor planning and management. Many engineers are assigned positions totally unrelated to their specialty and, because of the narrowness of their educational background, require additional training or considerable on-the-job training to be of nominal use. Other engineers are employed in areas that require no engineering skills. They are used to fill administrative positions in procurement for industries and to supplement the agricultural work force at harvest time.

Another reason for low productivity is a severe shortage of support services, especially in automated data processing and advanced computer systems. The lack of ... [illegible]

amount of engineering research and development time (up to 40 percent in some cases) to be spent on manual calculations and administrative matters that could be handled easily by machines.

A third cause is that many engineers, especially junior engineers, are abused by being used as technicians which does not allow them to be used to their maximum potential. The Soviets feel that a ratio of four technicians for every research and development engineer is vital in maintaining an effective productivity level for the individual engineer. At present, the technician engineer ratio is 1.5:1 and shows little sign of significant increase in the near future. Therefore, for the engineer to be effective, many engineers must be employed as technicians, causing the need for the Soviets to maintain an exceptionally large research and development work force.

These aspects combine to reduce the efficiency of the research and development engineer. Since the Soviets are unable to be highly efficient, they employ large numbers of engineers (quantity not quality) to be effective in research and development.

Observations

The Soviet Union is shifting from an extensive growth to an intensive growth of their economy and research and development work force. They are stressing quality of personnel, especially in their engineering graduates, rather than quantity, which is no longer available. The increase in productivity for the engineer will remain a high priority as the Soviets attempt several methods to improve their scientific and technical manpower base. However, productivity of the engineer will remain at a low level until larger numbers of qualified technicians are trained, support services are increased, and bureaucratic problems are solved.

[illegible] methods need to be fully [illegible] including the development [illegible] trained engineers and major [illegible] the planning process. It [illegible] to create an efficient [illegible] technical work force. ■

DOD Hotline Puts "Heat On"

Sgt. Maj. Rudi Williams, USA

American Forces Information Service

It's getting hotter for people who have no qualms about filing false claims, wasting government money, overpricing supplies and equipment, abusing authority, engaging in favoritism and nepotism, and other unscrupulous undertakings.

And that heat is being generated by the DOD Hotline.

In the past 3 years, the chance of the bad guys getting caught has risen tremendously—thanks to a combined "army" of members of the Army, Air Force, Navy, Marine Corps and the civilian work force who are incensed about their tax dollars being misused and ripped off.

They telephoned and wrote letters of complaint at an astonishing rate.

In 1984, Hotline complaints averaged 880 a month—an increase of 350 per month over 1982 and 1983.

And "Hotline 1985" has gotten off to just as auspicious a start. More than 840 telephone calls and letters were received in January 1985. "We received 134 letters and 606 telephone calls during the first month of this year," said Ben Simon, chief of the DOD Hotline. "We also received eight referrals from the General Accounting Office and 192 'follow-up' calls from people asking what happened to their complaint."

More than 90 January telephone calls and 50 letters had been investigated by mid-February. An additional 23 letters were sent to the agencies concerned because "there wasn't enough information to open a full investigation, but we felt the complaint needed looking into," said Simon.

Tipsters have contacted the Hotline more than 23,400 times since June 1981, leading to some 7,635 inquires. More than 6,490 of those cases are now closed.

Spare Parts Overpricing

An Air Force sergeant advised the Hotline that a microcircuit was being bought for $195, although a similar part could be purchased for $5. An investigation substantiated the sergeant's claim and saved the government $800,000.

In another case, a caller complained that a blanket used to protect the inside of aircraft available through Defense supply channels at $201 in 1982 had increased $733 in 1983. A competitive contract was awarded for the blankets, with projected savings to taxpayers over the next 3 years of $158,000.

Abuse of Authority or Position

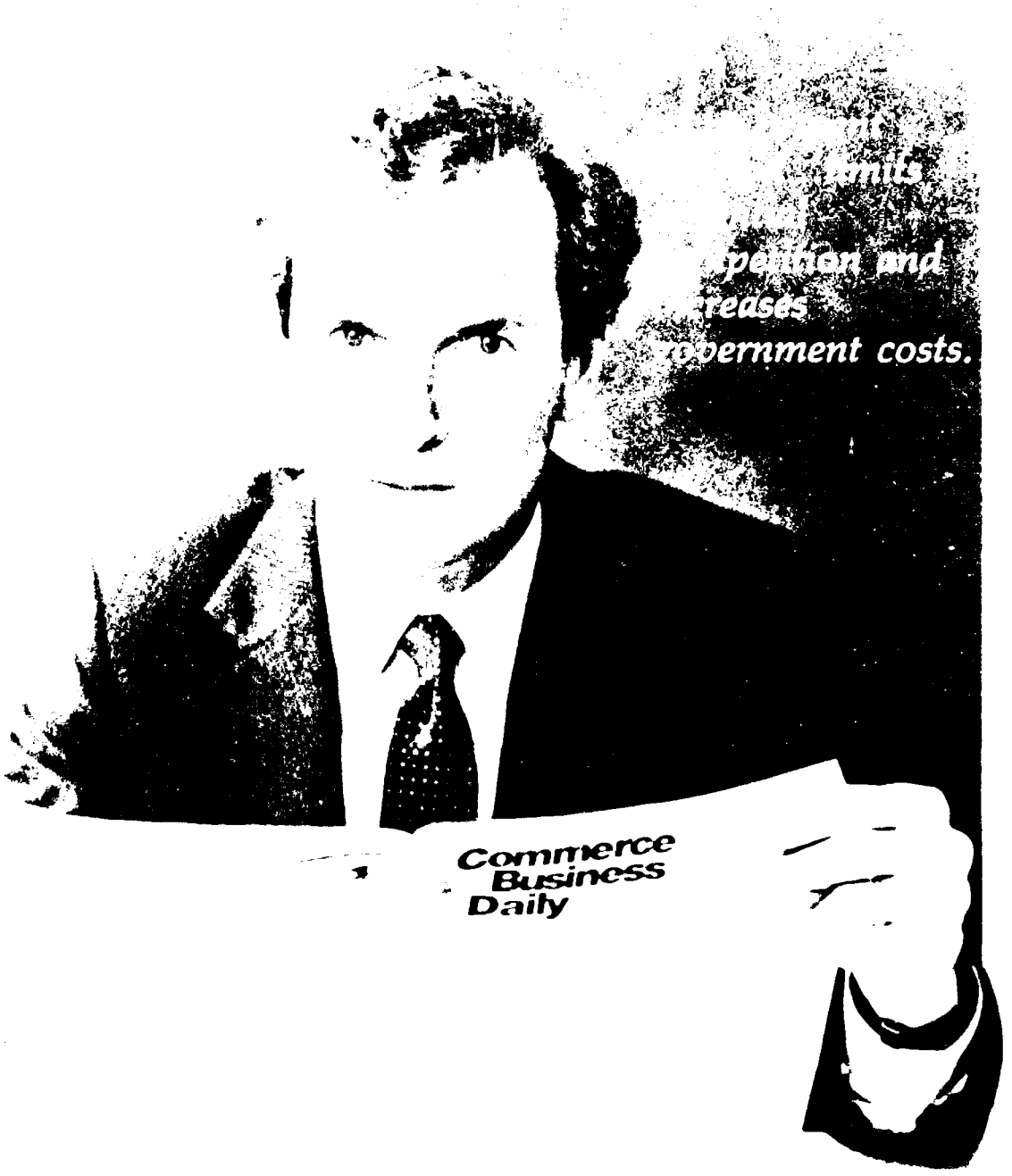
A naval officer, working as a contracting officer, directed a prime contractor to award two $22,000 contracts to a subcontractor. The subcontractor then subcontracted with another firm, of which the naval officer was the sole director. After pleading guilty to the charges in federal court, the officer was sentenced to 6 months in jail and fined $6,000. The Navy is seeking civil recoupment of the $44,000.

Another Hotline caller alleged that an Air Force officer was conducting personal business while on duty. An investigation revealed the officer was representing two retail firms and was selling products to subordinates and other personnel while on duty. The officer received an Article 15, was fined $817 a month for 2 months, and was allowed to retire instead of being court-martialed.

In addition to being an effective way of getting information that leads to cost reductions and improved management procedures, the Hotline has helped improve credibility with DOD employees and the public.

"It has taught the department (DOD) to listen carefully, to proceed cautiously and, if warranted, to act firmly," a spokesman said. "It's a valuable tool in ensuring that DOD activities are not compromised by conflicts of interest, abuse of authority and misuse of special privilege." ■

PERSONAL VIEWPOINT



Requirements of Federal Acquisition Regulation (FAR) Part 5, and April 1, 1985, changes to FAR as a result of Public Law 98-72, 98-577, and the "1984 Competition in Contracting Act," mandate that contract opportunities and award information be publicized more widely. Specifically: "Contracting Officers shall publicize contract actions offering competitive opportunities for contractors and subcontractors *in order to increase competition*, broaden industry participation in meeting government requirements, and to assist small business concerns, small disadvantaged business concerns, and labor-surplus area concerns in obtaining contracts and subcontractors."

Additionally, FAR Part 5.404 suggests that long-range acquisition requirements be publicized *as far in advance as possible* to assist industry planning and to locate additional sources of supply.

The present method of publicizing and providing information about federal procurements is to use the *Commerce Business Daily*. Information is not available now until CBD publication – approximately 45 days before bids are submitted. This limits potential competition and increases government costs.

Concept

Imagine that you are a small-business producer of a common industry commodity – like a chain and wire rope. Imagine that you must examine your business base, while recognizing that you have only 3 months between production contracts. This requires a decision. You can either cut back production, which is inefficient; you can sell the excess production in your normal market at reduced costs, which impacts your future price and customers; or, you can find sales outside your normal market. If a computerized data base were available to pinpoint Department of Defense purchasers and the quantity of the product usually purchased, you would have the ability to sell your product at a low but reasonable cost to satisfy the requirement of the Department of Defense without it being a usual customer.

After examining past purchasing history, projections of future purchases, and identifying agencies that buy the product, you may contact the agency for information to permit making those decisions, based on greater confidence of an existing market. The concept I propose would be the creation of a computerized data base that would provide information on past purchases, projected purchases, approximate price history, and major competitors. Current information processing and communication transmission can provide data bases showing projected purchases of commodities, parts, and services months and years in advance of the planned procurement. Data bases and communication lines are available throughout the United States to provide access to potential bidders on government purchases. Present time-share lines and data bases include Tymenet, BRS, Dow Jones, Boeing Computer Services, McAuto (McDonnell Douglas), TRW, Defense Marketing Services, and Data Resources, Inc.

We don't suggest that CBD is obsolete, but a computerized data base could open up procurement to a wider industrial base and assist in defense planning.

A data-base structure could be set up by a commercial data-base company at no cost to the government with information provided by government purchasing and planning departments from throughout the United States.

This assumes that time-share companies would be willing to make capital investments to open up a new market of information handling. The commercial company managing the data base would provide to potential bidders, for a nominal fee, access to the computerized data base using a microcomputer and modem. The process of business planning then could be a reality to small businesses that have neither the time nor ability to employ marketing professionals to obtain information on planned government procurements using techniques now required. The interested company could examine potential government purchases in its area of interest and geographical region. This would permit more efficient decisions on plant usage. Consolidation and increased sales in the company's area of core competence should lead to more efficient production rates, permitting high-quantity and high-volume production, but with less cost to all customers due to automation which, under the new conditions, would become affordable.

Author's Note:

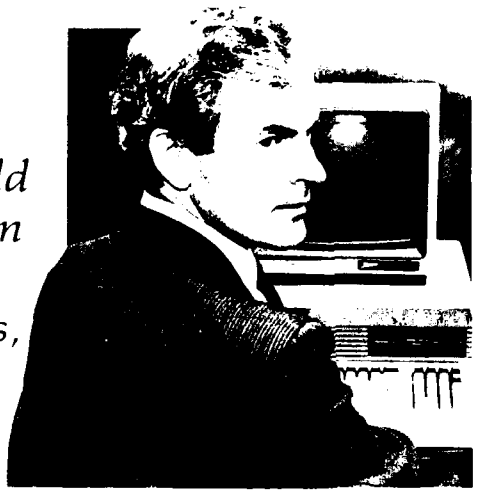
All data presented in this paper regarding contractors and contract awards were derived from a public data base accessable by industry and government. I want to express special thanks to the management and staff of Data Resources, Inc., and Defense Marketing Services, who provided access to their on-line organizational structures, assessed my proposed concept, assisted in the structure of proposed formats, and provided data for analysis. Special thanks to Ralph Doggett and Dr. Fred Arnold of DRI for devoting personal time to review and make suggested changes in the material.

An Example

An example of this new concept and its use follow. "Wrapcable Corporation," located in Texas, does business primarily with oil drillers. The company has a production rate supported with contracts from major oil companies. Unfortunately, the contracts have a 2-month interval between them that precludes a market for full production in that period.

By using a small computer with dial-up modem, the company could obtain information from the proposed data base about the quantity of cable the government intends to buy over the period of interest. The proposed data base would provide sufficient data to show the type and size of cable, and the approximate price of cable previously bought. Making the past price available would be a significant departure from the present, as the price paid is considered privileged information. *In fact, it is available to anyone* by reviewing the awarded contract, which is available to the public. Again, this is most likely done in the business environment today by large companies with experienced representatives working on government business.

... The creation of a computerized data base that would provide information on past purchases, projected purchases, approximate price history, and major competitors.



With information on Department of Defense requirements for cable procurements during the planning time frame, the company would have an opportunity to examine further the availability of the stated procurement, and its delivery location, which would enable the company to plan a smooth production run with an opportunity to sell the product to DOD at a very favorable price for the government. In fact, in some cases the price may be at variable cost (as opposed to variable cost-plus burden).

Lower prices may be expected when a company is attempting to enter or expand markets. The government, by its advertising of recurring requirements, provides sufficent information for these companies to see potential for selling off inventory, smoothing production runs, selling products no longer part of the company business or, in some cases, to decide that the government is a desirable customer and should become a continuing part of the company's business base. The obvious result of the above changes would be a reduced cost to the government and a more efficient operation of the U.S. economy.

Reasons to Implement the Concept

The reasons for implementing this new concept can be summarized as improved cost and efficiency. The federal government is now required to advertise its intended procurement for 15 days before release of a solicitation. This is to be done by placing notice of the intended contract action in the *Commerce Business Daily*, which is published in Chicago.

After an organization develops a request for proposal, it may take several weeks for processing through a local contracting office. The CBD advertisement must then be typed in a specific format, sent to Chicago, and then printed. Some of these transactions are taking more time than anticipated, thereby holding up procurement action.

The new concept I present would provide a more efficient alternative to the CBD and would, in fact, give earlier warning and planning information as required by FAR Part 5.404 (Release of Long-Range Acquisition Estimates). Additionally, the Congress is trying to balance societal needs and to ensure that the nation is properly defended. These two sectors have growing funding requirements and it may not be possible to fund one at the expense of the other.

Why a Small Business Emphasis?

Another major consideration of the contracting process for post-production support is the relative power and position of major contractors versus small business producers. When major system work is contracted, effort is required to pull together teams of industry members with sufficient understanding of large systems and system engineering, and with sufficent corporate backing to share the financial risk that large contract ventures require.

This risk usually precludes small businesses from participating. The result is that large businesses usually obtain the system research and development contract and, consequently, follow-on production. After production, the government continues to buy most parts and services from the procuring contractor for several reasons including (1) the lack of adequate technical data packages to permit small businesses to compete for follow-on part purchases, and (2) the government procurement organization is so large and structured that it is difficult for small or uninformed businesses to deal with the government procurement process.

While the government is dedicated to improve these conditions, the barriers presented to a prospective contractor require full-time industry marketing personnel who understand the government's environment, budgeting and accounting system, and reporting and control processes. Many small business proprietors have given up in frustration after weeks of trying to obtain sufficient data to develop a bid, only to find after much effort and expenditure that the contract was not really competitive at all but had gone

to the same contractor every year since the major item was put in the field.

The government's present funding limitations and debt obligations, and the rates-of-growth of those obligations, require that we seek solutions through an examination of changing the efficiencies and processes by which the job is done. One area that deserves more attention is the management process by which we advertise and procure spares and materials. The new concept proposed above provides a more efficient alternative.

Considerations for Implementation

On January 29, 1985, the secretary of defense announced a staff reorganization creating the position of assistant secretary of defense for acquisition and logistics. This person is to have responsibility for increasing competition and improving problems now experienced in procurement and support.

The concepts I address herein are aimed at these same goals. On April 1 1985, the provisions of the 1984 Competition in Contracting Act became effective with changes to the FAR. These included requirements for more competition for all purchases, with emphasis on wider and earlier dissemination of information needed for competing. Better information dissemination is needed at *lower levels of business* to permit small and disadvantaged businesses more valid opportunities for federal contracts.

In November of 1984, officers of a data time-share corporation provided me with a feasibility response to my proposed concept. They validated that the entire United States could be accessed by the smallest of businesses interested in contracting with the government. I was assured that within 4-6 months of concept approval, they and several others would be willing to provide on-line services to small businesses at *no charge to the government*, if the government would provide the planned procurement data on a recurring basis.

Subscribers would be able to call up a data base on a large high-speed computer accessed by a personal-sized computer with a communications device (modem) and examine potential purchases of interest. The data could be sorted by commodity; e.g., tires. It could be sorted by region, e.g., Utah. A business planner could locate potential business within any geographical region.

Decision-makers should recognize that this concept addresses high-cost growth areas; that is, parts, supplies and services for military systems.

Conclusions

Decision-makers should recognize that this concept addresses high-cost growth areas; that is, parts, supplies, and services for military systems. One obvious response to be expected from government procurement officers is that they don't have data far enough in advance. However, the procurement pattern has been established over several years so that a reasonable projection of parts and materials can be made for years in advance, and often has been budgeted at specific levels.

Another expected response is that time and cost to provide data would require more people. However, if the proposed concept distributes the information more efficiently, the workload should not be greater but would be shifted to a more efficient use.

Results Expected

The use of computerized data bases for display of intended purchases is expected to be a cost-effective means for meeting requirements of FAR Part 5 in a more efficient way than could be done with printed text. The automated data can provide more information that can be quickly retrieved nationwide by potential manufacturers of all sizes. Use of automated data lines can cut lead-times significantly, and would permit competition and long-range business planning that should result in better prices for DOD procurements.

Research on competition to date has shown that for high-rate, high-volume items being bought over long periods of time, the insertion of competition has almost always brought an immediate reduction in price; also, it has provided a faster reduction of future prices as competitors focus management attention on cost reduction to obtain and keep contracts.

Such procurement strategies have been used for years in the purchase of major systems, and ordnance items like ammunition. Results have been dramatic with a cost reduction of 60 percent in some missile programs, and with improved reliability! Recognizing that more than 50 percent of a weapon system's total cost is in the follow-on operations and support, and assuming a savings of only 10 percent, the savings potential is in the billions of dollars per year.

Perhaps the most important result one could expect from this concept is the improved capability to communicate rapidly with all industries. This would permit planners of businesses to view more options for their productions. It would provide actual and perceived competition for a wider range of purchases, thereby giving a competitive price from producers that previously had been unchallenged.

With the ability of large and small businesses to plan more than a year in advance, they could make capital investment and inventory decisions, as well as market-relocation decisions to improve the entire economy.

Summary

While there are no free lunches, many opportunites are being provided by new technology. This is one of those opportunities. The technology, commercial companies, and industries seem ready to implement it. We need the improvement that could be expected in cost savings, redistribution capability of capital, nurturing of small business, and public confidence.

The annual expenditures for equipment maintenance and repair, plus spare parts beginning in 1985 is expected to exceed $15 billion in DOD alone. Savings in excess of $2-3 billion per year within 5 years of implementation are reasonable with no capital expenditure by the government.

This requires a cooperative attitude by the government in providing current information on intended purchases. The time required to establish the communication service is very short because several data-base companies already have networks nationwide. The time to develop the data base is dependent on which items are included and whether data is initiated in one region and expanded one region at a time with lessons-learned incorporated, or immediately implemented nationwide.

■ *Mr. Caver is a professor of engineering management at DSMC.*

Use of automated data bases with access available to all manufacturers needs to be included in the FAR.

Use of automated data bases with access available to all manufacturers needs to be included in the FAR. Currently, it is not one of the acceptable methods of information dissemination listed in FAR 5.101.

The number of potential manufacturers, the items being advertised, the amount of information to be communicated, and the time required to disseminate the written information are increasing trends that beg for a better method of information dissemination.

The new method I propose satisfies the intent of FAR Part 5 and provides information for long-range acquisition estimates as required by FAR 5.404.■

Manning

(Continued from page 15)

levels, other useful information could be produced. The mapping process basic to such a component would permit analyses in which all but one of the component parameters are held constant, and that one is predicted. For example, ideally if all parameters except amount of training were held constant, it would be possible to predict the required amount of training needed to reach a given performance level, by personnel with a given value of a given characteristic using a given interface.

Population Predictor

This component determines the number of personnel available with a given mix of characteristics at a given level, in a specified time period. It performs availability analyses in the design influencing phase. In the hardware software design evaluation phase, this component predicts numbers of personnel based on the output of the analysis-characteristics map.

The population predictor may be thought of as a multidimensional matrix. Each personnel characteristic is a dimension of that matrix. Each dimension is partitioned into values of the characteristic (Aptitude X: high, medium, low). Each value of each dimension can be connected to other values of other dimensions in the matrix. The connection of the values of dimensions may be thought of as producing a cell in the matrix. Each cell in this conceptual matrix contains: number of personnel with the defined mix of characteristics levels (for the time period in question); and, percentage of that number assigned to other systems or is otherwise unavailable for manning the system in question. To compute contents of the cells, it will be necessary to have data on the number percentage of each characteristic level expected in the Army population. Each cell will have to access a module like a look-up table to determine the degree of dependence of the characteristics. As this component is used for the manning evaluation of systems, it will have to store resulting data to determine numbers of personnel already assigned.

This logic should lead to an understanding of how to design a working system.

Concept Definition Conclusions

There are two general ways to provide system hardware software that can be manned adequately by the available types and numbers of personnel: by influencing the hardware software design process directly, and by evaluating output of that design process to determine its effects on manning. Both require a data base of personnel characteristics, organized according to personnel aptitudes and significant characteristics, and that can map hardware software design and required performance to those characteristics.

In this paper, I have described concepts for aiding these systems manning processes through the use of such a data base. My purpose is to provide an upper-level description for such methods and for their logic. This logic should lead to an understanding of how to design a working system in detail, and the areas of further research that will be necessary to implement that design.■

The Journal of the Defense Systems Management College

Program Manager

Subscription rate is $17.00 per year for six issues. Single copy is $3.00. The foreign subscription price is $21.25. The foreign single issue price is $3.75. See subscription blanks for ordering instructions.

SUBSCRIPTION ORDER FORM
ENTER MY SUBSCRIPTION TO

ProgramManager (SIX ISSUES) (PM)

[ ] $17.00 U.S. and possessions
[ ] $21.25 *foreign subscriptions*

Credit Card Orders Only

Total charges $ Fill in boxes below

Credit Card No.

Expiration Date Month/Year

Send Subscription to:

Name-First, Last

Street Address

Company name or additional address line

City State ZIP Code

(or Country)

PLEASE PRINT OR TYPE

Enclosed is $_____ ☐ check ☐ money order, or charge to my Deposit Account No.

☐☐☐☐☐☐-☐

Order No._____

PAYABLE TO SUPT. OF DOCUMENTS

Mail to: **Superintendent of Documents**
U.S. Government Printing Office
Washington, D.C. 20402

END

FILMED

8-85

DTIC